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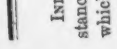

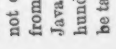

THE ENGINEERING AND MINING JOURNAL.

HENRY W. TROY - DEL. COLLINS & SHUGG. SC.

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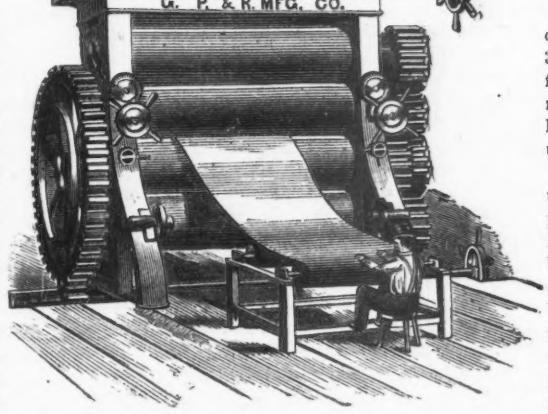
Vulcanized Rubber.

INDIA-RUBBER, or caoutchouc, is a peculiar vegetable substance, occurring in the milky sap of several kinds of plants which grow in South America, the East and West Indies. The rubber from different localities differs in quality, since it is not only prepared in various way, but may even be obtained from quite diverse plants. *Urceola elastica*, the rubber-tree of Java and Sumatra, grows in five years to the height of two hundred feet, and a diameter of twenty to thirty inches; may be tapped annually, and yields, without perceptible injury to its growth, fifty to sixty pounds of gum per season. The Brazilian rubber-tree is called Seranga, and the collection of its gum occupies, in the small province of Para alone, not less than 25,000 Indians. Mr. Griffith saw in Assam a trunk of *Ficus elastica* measuring 74 feet in circumference. There were 43,000 of these rubber-trees in one forest, thirty miles long and eight miles broad. In Africa rubber is also procured; but the quality, perhaps on account of the rude methods employed in gathering it, is quite inferior. The milk of many smaller plants, such as euphorbia, dandelion, etc., is said to contain rubber.

This substance became known in Europe in the beginning of the eighteenth century; but the employment was, for a long time, quite limited. Not until the remarkable process of vulcanization was invented did the applications of caoutchouc attain their present importance and extent.



THE CALENDARS.

The method of collecting the gum is very simple. Incisions are made in the trees, and the exuding sap is caught in hollows in the ground, lined with large leaves, or in rude vessels of clay. Sometimes dry clay mandrels are dipped in the fluid, dried, dipped again, and so on, until a coating of sufficient thickness is obtained. After a final drying of one or two days, the interior mass of clay is broken out, and the rubber remains in the form of the "bottles" in which it used to be brought to market. The uncouth over-shoes, known twenty years ago as "gums," were made in the same way, upon lasts of clay. At present, however, if we may judge from the appearance of the crude gum arriving at New York, the sap is poured upon thick clay floors, which absorb the watery portions, leaving the gum in plates. The Para rubber (which is the best in this market) is said to be dried first in the form of "bottles;" but generally those are consolidated by pressure into more or less regular masses. The Carthagena rubber comes in large lumps, formed by the compression of thin plates. It is darker in color than that of Para, possibly from being subjected to a smoky fire to accelerate the drying process. Crude Para rubber is sold here at from 65 cents to $1 10; Carthagena, at from 40 to 65 cents per pound. The pure gum, when chemically separated, is white or colorless. The commercial article, however, presents all shades, from light brown to black.

We do not intend to describe in detail the properties of ordinary rubber. Many of them are familiar to everybody. The most useful are its elasticity, softness, and indifference to water and acids. The latter is not absolute. Dilute acids affect it slightly; concentrated muriatic acid alters it slowly; concentrated sulphuric acid gradually transforms it into a turpentine-like mass; and nitrous, or fuming nitric acid, attacks it with great energy. Caustic alkalies have no effect upon it.

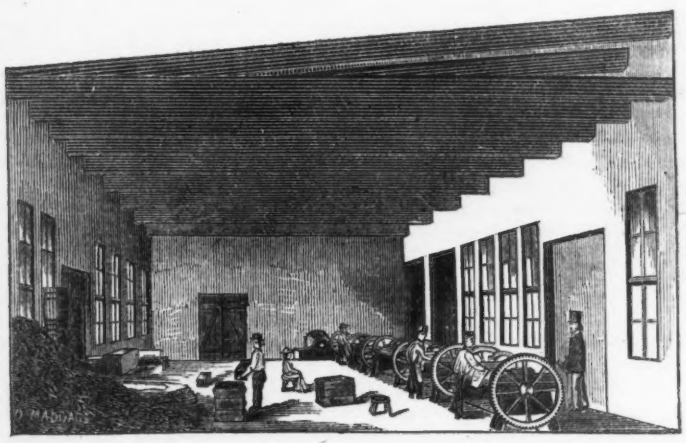
One property of rubber is very troublesome. It is singularly sensisive to changes of temperature, which alter in a high degree its valuable qualities. At the freezing-point it becomes harder and less flexible, refuses to adhere when its fresh surfaces are pressed together, and loses to a great extent the capacity of being stretched. Nor does it recover itself on being warmed again to 60° or 70° Fahr. At about 100° it recovers elasticity. It is evident that, since the freezing-point is a common atmospheric temperature, and 100° a comparatively rare one, articles of rubber are pretty certain, sooner or later, to become suddenly useless, and to require a sort of annealing before they can be used again. But the change in structure is likely to be known first by the breaking of the article; hence the possibility of reheating is no consolation.

Compensation for this evil is afforded in the affinity of rubber for sulphur. When these two substances are combined in a certain way, the result is a rubber which appears indifferent to ordinary changes of temperature, not becoming hard or brittle under extreme atmospheric cold, nor softening excessively even at the heat of boiling water. Moreover, it is almost or quite insoluble in the solvents of rubber, is far less altered by destructive acids, and maintains a nearly uniform elasticity.

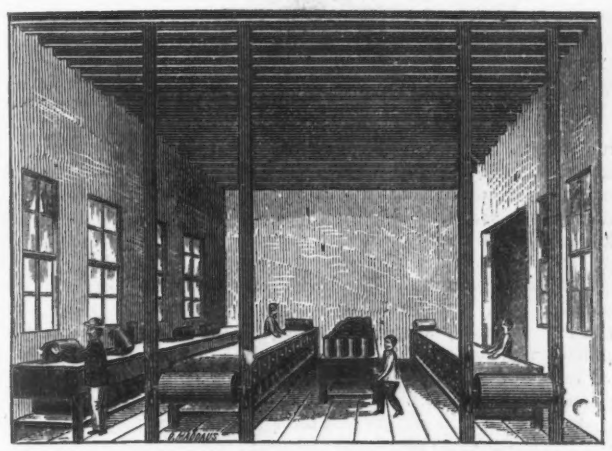
The first method of vulcanization was that of HANCOCK, who dipped the rubber in melted sulphur, and heated to nearly 300°. This method is, so far as we know, no longer anywhere followed. HANCOCK noticed that if he heated the immersed rubber too long it became black, lost elasticity, and assumed a horny structure. This hard rubber was afterward made widely useful by GOODYEAR.

There are several other methods of vulcanization. One is the development of sulphur vapors, which are spread, with superheated steam, into the mixing apparatus. Another is PARKES' cold method, producing the so-called converted rubber. According to this plan, the completed rubber objects are carefully cleaned and dried, and immersed for one minute in a bath of one part dichloride of sulphur with forty parts sulphide of carbon, after which they are quickly dried in a warm draught. The difficulty is, that the surface, especially of thick pieces, takes up too much sulphur, rendering the articles brittle and worthless.

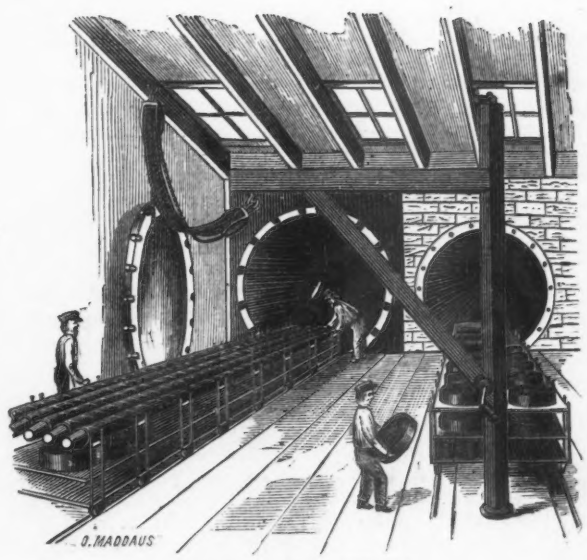
But the most common, and, for general purposes, probably the best method of vulcanization is that of mixing the gum mechanically, under moderate heat, with flowers of sulphur, and subsequently "curing" it in superheated steam at 250 and 300° Fahr. This process we shall now fully describe in the sequel. Before we can explain it clearly, it will be necessary to show how the rubber is brought from its crude state into a condition suitable for vulcanization and manufacture.



THE MILL-ROOM.



MAKING THE BELTS, ETC.



THE CURING CYLINDERS,

As illustration is better than abstract talk, we invite the reader to visit with us a first-class manufactory, the works of "The Gutta-Percha and Rubber-Manufacturing Company," in Twenty-fifth street, New York. As we enter, our eyes are greeted with a vista of large, well-lighted, white-walled work-rooms, opening out of each other; our ears distinguish the rumbling of many cylinders, and our noses snuff with little pleasure a faint but not agreeable odor, akin to that of the tannery. In charge of an accomplished expert, the superintendent of the factory, Mr. JOHN MURPHY, we commence the tour of the works, following the rubber through all stages of its manufacture.

Here it is, sticky, dirty and tough. First of all, it is thrown into large tubs, and softened under jets of steam. Then it is put between two smooth steel rollers, which mash it and soften it still more, while water, trickling down upon it from above, washes away a great deal of the dirt. After being repeatedly passed through these rollers, it comes to a second pair, which are not smooth, but fluted or corrugated spirally. They fit loosely into one another, and the gum passing between gets terribly masticated. Meanwhile water is kept trickling through, as before, and washes away the remaining impurities.

At this point, the *rationale* of the whole process bursts upon us. Did we ever chew India rubber at school? Of course we did; and we remember well how, by long-continued grinding and salivation, it became at last a dainty, clean, white mass, tempting the fellows to whisper hoarsely across desks, "I say,

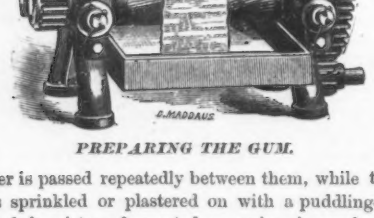
Bill, lend us your gum!" Spruce. Jenny Lind, Burgandy pitch—these are well enough for evanescent cuds; but rubber is the thing for a long chaw! But alas! the progress of science disturbs our little pleasures; and here is a big machine chewing gum for us.

It spits out the impurities below, and its huge mouthful grows momently softer and purer. Soon it is pronounced clean, and sent up stairs in regular sheets to dry. Here it hangs in an airy, steam-heated loft until it is needed for the purposes of the manufacturer. The longer it dries the better; the good qualities of rubber all require that it should contain no water. At these works, the great consumption of material makes a heavy demand on the drying-room; and in perhaps three weeks the sheet of gum that we saw hung up just now will have to go down and be chewed up again. We will follow this other one, which has served its time on the clothes-line, and is just starting for the grinding-mill.

The grinding-mill is likewise a pair of steel rollers; but they are dry outside, and heated within (being hollow) by a jet of steam entering through the axle. Here the rubber is softened and squeezed through and through. The workman watches it as it comes out, like dough under the housewife's roller, and continually puts it back again, until it has attained a beautiful even consistency. There are sixteen pounds of rubber in each batch; and it is rolled into a sheet about four feet square.

It is now ready to be mixed with the vulcanizing compound. This contains, besides the flowers of sulphur, other ingredients intended to give color, body and softness to the vulcanized gum. Litharge, white lead, zinc-white and whiting are among them; and in these works a peculiar use is also made, as we informed our readers on a previous occasion, of carbolic acid. But our present object is to describe the ordinary process; hence we shall postpone for a little time the discussion of this strange ingredient, the patent for the use of which is the exclusive property of the Gutta-Percha and Rubber Manufacturing Company.

The vulcanizing compound is applied to the rubber in mixing-mills. These are almost exactly like the grinding-mills already described. The rollers are hollow and heated by steam, and



PREPARING THE GUM.

the rubber is passed repeatedly between them, while the compound is sprinkled or plastered on with a puddling-stick or trowel, and, by virtue of repeated squeezing, is evenly distributed throughout the mass. This process is exactly paralleled in the kitchen, when the cook distributes salt, etc., through the dough, by rolling it repeatedly. The accompanying illustration shows the mill-room of these works, with the grinding and mixing-mills.

When the rubber comes from the mixing-mills it is soft, almost like putty, and has the white color familiar to purchasers of vulcanized goods. But it is not yet vulcanized, but must first be subjected to a high temperature, to effect its chemical union with the sulphur and other materials which are now only mechanically distributed through it. This heating process is usually the last of all, the articles desired being completely manufactured first, and "cured" afterward.

At these works the principle articles of manufacture are hose, beltings, steam-packing, buckets, safety-rafts or pontoons, disks for valves, etc. Most of these are composed of rubber with duck or other cloth; and the process by which the rubber is spread upon the cloth is highly interesting. After leaving the mixing-mill, the sheets of rubber are piled up, and await their turn to be used. When one is required it is passed first into a warming-mill, another pair of steam-heated rollers, the function of which is to soften the mass, which has hardened somewhat in cooling. It is then run through the heavy cylinders, or "calenders," shown in the accompanying illustration. Here it is evenly spread over the surface of the cloth, which has previously been prepared to receive it.

After the cloth has been coated on both sides with the gum, it goes to the different manufacturing rooms, to be made up into the required articles. As its ordinary width is forty-two inches, cut on long tables, into proper with, the manufacture of twelve-inch belting from it is a very simple matter. The sides are turned over till they meet in the middle, and the seam is covered with a strip of gum. This is done very rapidly on long tables, as is shown in the engraving.

The outside coating of the belts contains a strange ingredient not hitherto mentioned. In the mill-room we might have seen a great heap of rags and scraps from the cutting department, where the strips are cut to make hose, etc. All these scraps of duck and rubber are saved, and ground fine with fresh rubber. The result is a gum with more fibre and strength than the pure rubber. It is found to wear excellently on belting; and it is so highly prized that, if the establishment did not turn out rags enough to cover the belts it makes, no doubt they would tear up something to get the necessary refuse!

The hose are made in the same room, strips of the coated cloth cut "bias" being obliquely wound around mandrels or long round poles, as large as the desired internal diameter of the hose. Mr. W. A. TORREY, the manager of this company, has patented a peculiar way of cutting and winding these strips, which gives to the hose manufactured at these works their wide celebrity for strength and endurance. The hose are wound in as many thicknesses as the purchaser may demand. Three, four, and five-ply hose are the most common.

Belting, hose, and other articles are now to be vulcanized or "cured." This is performed in cylindrical chambers, the heads of which can be tightly closed after the goods have been rolled into them in trundling frames. The illustration gives a view of two of these cylinders, both open. On the two long trucks are the goods to be cured. The heat is given by filling the cylinder with live steam. A system of steam-pipes in the bottom serves to prevent the free steam around the goods from condensing. The temperature is watched by means of a thermometer, and carefully regulated. It is a remarkable fact that goods in the preparation of which carbolic acid has been used will "cure" in a shorter time, and at a lower temperature, than any others. This is a great advantage, since long exposure to high temperatures is injurious to the material. The fact, therefore, that 20° in temperature, and one third in time, are saved by using carbolic acid, makes it a most valuable reagent. But it has still another property of great importance. Our readers will remember that it is a disinfectant and antiseptic—a preventer of decay. Hence its wonderful effect in preventing mildew and preserving cloth, as shown in the hose of this company. But it now appears that carbolic acid is directly a preservative of the vulcanized rubber itself. This might indeed have been foretold. Vulcanized rubber is subject to decomposition which destroys its elasticity and strength. This decomposition is, in our opinion, caused by oxidation. At least, vulcanized gutta-percha, after such decomposition had set in, was analyzed and found to contain oxygen, which in its fresh condition it does not contain. This may be oxidation of the sulphur or of the rubber. In either case it would spoil the material; and a fluid antiseptic, thoroughly mixed with the mass in the process of manufacture, would be most likely to arrest it. This is precisely what carbolic acid does.

Now that the patents of GOODYEAR and others have expired, many parties are engaged in manufacturing articles of vulcanized rubber. The field is open to all, and there are few secrets left in the process. The Gutta-Percha and Rubber Manufacturing Company is lucky in having obtained, in the patent for the use of carbolic acid, a new and distinctive advantage over all competitors. Mr. TORREY, the manager, and Mr. MURPHY, superintendent of the works, deserve great credit for the intelligence and perseverance with which they have carried forward their experiments to a successful issue.

Improved Process of Extracting Silver and Gold from Arsenio-Sulphurets of Lead, Copper, Etc.

By C. WIDEMANN.

THIS very interesting and entirely new process was discovered and has been patented in all mining countries by CYPRIEN MARIE TESSIE DU MOTAY, of Paris, France, and is already practiced on a large scale at the metallurgic establishment of Coumnies, France. The process consists in the following series of docimastic treatments of the simple sulphurets, the complex sulphurets, and the arsenious sulphurets of lead, antimony, copper, and iron, as well as coppery mats and coppers containing precious metals, in order to extract silver and gold therefrom at a great saving in time and labor.

First. In roasting the simple or complex sulphurets, the antimonial sulphurets, and the arsenio-sulphurets containing silver or gold, in the presence of pure silicates of auriferous quartz or earthy and metallic silicates, adding, in order to complete this roasting and to expel all the sulphur contained in the minerals, either lead, which is intended to form oxide of lead, or litharge, or any other metallic oxide capable of producing, in contact with air or oxidizing flames, peroxides or silicates of peroxides.

Second. In thus transforming into the state of very fusible basic silicates, the oxides of the desulphuretted metals.

Third. In melting or running in the melted state the silicates of this kind produced upon a mat of lead also melted, and in stirring or agitating them, either by paddles held in the hand or by mechanical means, or by means of gases mechanically employed, up to the moment when the gold and silver are entirely dissolved in the melted lead.

Fourth. In separating the poor scoria deprived of the precious metals of the lead, which has taken them up, and in stirring or agitating upon the same mass of lead a fresh quantity of rich scoria.

Fifth. In repeating this liquation an indefinite number of times, until the moment when the capacity of saturation of the lead for the precious metals, which is lessened by each operation, no longer permits the continuance of this mode of treatment.

Sixth. In testing the lead saturated with silver or gold, by the methods of cupellation now in use, in order to extract therefrom the precious metals.

Seventh. In removing the poor scoria the oxides of lead, antimony, and copper, which, for the most part, are contained therein, by bringing back these oxides to the metallic state by the separate or united action of charcoal and iron.

Eighth. In separating, by the special methods presently described, the copper and antimony from the lead, with which they are united.

Ninth. In re-employing, either wholly or partly, the purified lead in the treatment, by oxidation and silication, of fresh quantities of minerals.

Tenth. In reducing, either in reverberatory or cupola furnaces, or in all other melting furnaces, the basic silicates enumerated above by the action of charcoal or iron, when the latter are the produce of minerals containing copper pyrites in considerable quantities.

The metallic matter thus obtained consists of an alloy of copper, lead, silver and gold, free from sulphur, which may be all treated at once, either by docimastic methods in countries rich in combustibles, or by the humid process in countries where mineral acids are low in price. Having thus stated, in a general manner, M. TESSIE'S docimastic method, let us describe the new operations and reactions whereby they are essentially distinguished from those at present employed for the same object. These operations and reactions consist, in the first place, of the roasting, the oxidation, and the scorification of the simple or complex sulphurets of antimonio-sulphurets and arsenio-sulphurets in the presence of silica and oxides of lead, or of all other metallic oxides capable of passing into the state of peroxides or of silicate of peroxides in the oxidizing flames, in order—

1. To prevent the formation of the oxysulphurets of lead, antimony, and copper, which afterward, in dissolving with the silver or gold in the lead, cause the loss, during the cupellation of an appreciable quantity of the precious metals, which are dissolved in this lead, and render inapplicable for industrial purposes, either the cupellated litharges or the lead proceeding by reduction from the said litharges.

2. To prevent the complete dissolution in the lead of the silver and gold contained in the basic silicates free from sulphur, without the antimony or copper, which have passed from the state of sulphurets into the state of silicates, being able to dissolve in the lead, and consequently to injure it.

3. To obtain as the final result of a series of liquations, a testable (cupellable) lead, rich in precious metals.

4. To avoid a great number of cupellations to obtain pure litharges transformable into lead of an equal purity, and to thus diminish the net cost of the industrial extraction of silver and gold, by means of the cupola, to a considerable extent.

The operations and reactions, in the second place, consist in the reduction to pure lead, or into an alloy of lead and antimony, and copper of the scoria deprived of gold or silver, in order—

1. If the extracted lead is pure, to make it again serve by way of roasting, for the oxidation of a fresh supply of sulphuretted, arsenio-sulphuretted, or antimonio-sulphuretted minerals.

2. If the lead is alloyed with antimony or copper, or with both these metals, to separate it from one of these metals or both together, in order also to use it again, after purification, for the oxidation of a fresh quantity of sulphuretted, arsenio-sulphuretted, or antimonio-sulphuretted materials.

The method for separating the lead from the antimony, or from the antimony and copper united, constitutes one of the greatest novelties and one of the most essential parts of the invention; taking, for example, an alloy of the lead and antimony, the inventor submits it, after having melted it in a reverberatory or a cupola furnace, to the action of the nascent steam produced by aerohydric or oxyhydric blow pipes, fed by a mixture in definite proportions of air, or of oxygen and pure hydrogen, or carbonated hydrogen. The flame procured by these blow pipes should be as free as possible from any trace of uncombined oxygen. It is even preferred, in order to prevent any oxidation of the lead, that the flame should contain a little hydrogen or free carbon. The nascent steam may, perhaps, be mixed with the ordinary steam generated at 212° Farenheit. The antimony, which decomposes water at a high temperature, oxidizes in passing into the state of antimoniate of oxide of antimony, one portion of which volatalizes while the other remains attached to the inner sides of the reverberatory or other furnace, in this operation, during which almost the whole of the antimony is separated, and the lead, which does not decompose water, is but little, or not at all oxidized, but still retains traces of antimony with a strong affinitive force, and in order to entirely purge it from this metal, it is necessary to have recourse to sulphate of lead. This new reactive has the property of becoming decomposed in oxide of lead, in free oxygen, and in sulphurous acid by antimony, which, by this decomposition, taking up the oxygen set at liberty, oxidizes and combines with the oxide of lead of the decomposed sulphate. The lead is then completely purified and rendered applicable for all industrial purposes. It follows, as a matter of course, that the sulphate of lead can, by itself, without the previous employment of steam in the nascent state, separate the whole of the antimony contained in an alloy of this metal with the lead, but, in many cases, to employ it would cost too much. Earthy hydrates, such as hydrates of lime and baryta, can also be effectively employed instead of steam in a nascent state, or ordinary steam from water, in order to oxidize the antimony and to separate it from the lead; but the inventor prefers the steam generated by aerohydric or oxyhydric blow pipes, which furnish at the same time the heat necessary for the fusion of the alloys and the reactive, which partly or wholly removes from the lead the antimony which injures it. When the lead is alloyed with copper, and this alloy does not contain antimony, it is melted with a quantity of sulphuret of lead rather more than equivalent to the quantity of copper, to transform into sulphuret; this fusion is conducted away from any oxidizing action in a reducing medium, and produces an immediate reaction by way of double exchange. The sulphur combined with the lead acts upon the copper of the alloy, and thus substitutes metallic lead for the copper, which scorifies and passes into the state of sulphuret. The lead thus deprived of copper, is pure and proper to be employed, as indicated above, either for the oxidation of fresh mineral, or it may be sold for general purposes. Alkaline and alkaline earths, bisulphurets, and polysulphurets, as well as metallic sesquisulphurets and bisulphurets may be substituted for the sulphuret of lead, in order to remove the copper from the lead by causing the latter metal to pass into the state of sulphuret. The sulphuret of copper may, after roasting, be transformed into metallic copper by the reducing process at present employed. When antimonio-sulphuretted argentifer-

ous leads have been previously brought to the metallic state by the method of reduction at present employed, the inventor submits them to the action of the same blow pipes, and when the antimony, which has passed into the state of oxide, has been separated from the lead, in which the silver r mains entirely dissolved, this lead is tested or cupellated, and the precious metal extracted therefrom. The chief points of novelty in this invention may be stated as follows :

1. The method of roasting and the silicatization of the metallic, simple, or complex sulphurets, arsenio-sulphurets, and antimonio-sulphurets containing silver or gold, by means of the processes above described.

2. The method of liquation and fusion by successive series of argentiferous and auriferous silicates upon the same bath of lead, which deargentizes and deaurifies them, by which method the same object is obtained by one cupellation, which, according to the best methods at present in use, requires several.

3. The method by which, after the oxides of lead, antimony, or copper contained in the silicates deprived of silver and gold have been brought back to the metallic state, the lead is separated from the copper with which it is united by the addition of an equivalent quantity of sulphuret of lead, or of one of the sulphurets enumerated above, and the antimony, by the action of the aerohydric or oxyhydric blow pipes, combined with the reaction produced by a small amount of sulphuret of lead.

4. The application of the above-described methods to the entire or partial treatment of copper mats and argentiferous and auriferous coppers of the minerals of antimoniferous lead and of the mineral of antimony containing silver and lead or pure silver.

We have no doubt this process will be accepted all over the world, as the series of manipulations are thus greatly simplified, as already oxygen is manufactured on a large scale at a reduced price, and so will be pure hydrogen in a very short time ; these two gases used in a blow pipe will satisfy in a practical way all the exigencies of the gold and silver refiners and smelters.—*Journal of Applied Chemistry.*

The Production of Iodine and Bromine.

By W. H. CHANDLER.

TO SCHEELE is the world indebted for the first intimation of the elementary existence of fluorine and chlorine, he having in 1771 referred the action of sulphuric acid upon flour-spar to the freeing of a distinct acid from the mineral, though whether fluorine has, even up to the present day, been isolated, is a matter of great doubt. In 1774 the same chemist isolated chlorine. In 1811 COURTOIS separated iodine from the waste liquor from the manufacture of soda ash from seaweed, followed by the discovery of bromine in the bittern of sea-weed by BALARD in 1826. The isolation of these four closely-allied elements from their compounds is thus included in a century, and the application of them to economical purposes, to any extent, was accomplished since the beginning of the present century. Their close relationship, their physical properties, and their chemical affinities, which are nearly in an inverse proportion to their chemical equivalents, induce one to the supposition that they are modifications of the same element.

The isolation of chlorine, bromine, and iodine from their compounds with the alkalies, is accomplished with equal facility. But the abundant store of the former in the enormous deposits of common salt throughout the world and in solution in the ocean and inland seas, forms a striking contrast to the rarity of the two latter halogens. In combination with silver, bromine and iodine are found in some rare ores in Mexico and South America. CHATIN claims to have detected iodine in rain water, though in very minute quantities, and even in the atmosphere. In sea-water traces of it have been uniformly detected, though not in quantities sufficient for quantitative estimation. Bromine exists in slightly larger quantities, and, associated with iodine and chlorine, is found in the ocean and inland seas, the mineral and saline springs, and salt deposits, throughout the world.

According to VON BIBRA, the amount of bromine in the Atlantic ocean, in one United States gallon, is 24 grains ; in the Dead Sea, examined by HERAPATH, 121.5 grains ; in the dried residue of the Mediterranean, 1.15 per cent. ; in the mineral spring of Kreusnach URE found 10.8 grains ; in Kissingen water, determined by KASTNER, 0.44 grains ; at Tenbury, in Worcestershire, examined by DR. URE, as high as 12.5 grains ; and at Arnstadt, according to HARTUNG, 13.6 grains. Iodine occurs in far less quantities, from mere traces to 2.2 grains per gallon, this latter quantity being found in the iodine spring at Halle.

In the United States both bromine and iodine have been detected in the various saline and mineral springs. Iodine was first detected in this country, in the Saratoga Spring waters, by DRS. USHER and STEEL, in 1830, and bromine in the same waters by DR. A. A. HAYES, and in the salines of Onondaga by Prof. B. SILLIMAN, in the same year. The quantity of bromine in the spring waters of Saratoga county, determined by Prof. CHANDLER, reaches 3.63 grains per gallon in the water of the Artesian wells, the largest amount of iodine found being 0.2 grain ; but in this country, as in Europe, it is in the salines that the quantity of these substances becomes of economical importance, and in a brine of the Saginaw Valley, Dr. CHILTON found 7.65 grains of bromine ; at Tarentum, Pa., 6 grains bromine and 4 grains iodine were reported by STIEREN ; in the salina brine analyzed by Prof. GOESSMAN, however, only 1.36 grains of bromine per gallon are reported.

Besides these various sources, iodine has been detected in the soda deposits of Peru, in the ashes of the Spanish barilla plants. Cod-liver oil is said to owe some of its medicinal properties to a trace of iodine. Though the distribution of bromine and iodine is thus very general, yet owing to their existence in such comparative minute quantities, the sources of our mercial supply are much more restricted.

Up to the beginning of this century the alkalies of commerce were derived from the ashes of plants, and the burning of sea-weeds was an important industry, especially in Great Britain and Ireland.

The amount of ashes of sea-weed, the so-called kelp, reached its maximum production in 1800, when 20,000 tons were collected. To produce this, 400,000 tons of wet weed were burned. From this time, owing to the removal of the import duty and to the introduction of the manufacture of soda ash from common salt, the trade declined. But the discovery of iodine in the mother liquors of kelp salts somewhat revived the manufacture—and it is to this source alone that the total supply of iodine in commerce is due. The high price stimulated the business, and in this country, in a few places in New England, iodine factories were established. These latter, however, were soon abandoned, the weed upon our coast being of poor quality. The process of separating the iodine is exceedingly simple, being nearly analogous to that for the isolation of chlorine. The ashes are leached with water, and the various crystallizable salts of potash and soda are separated by concentration. Carbonates, sulphates and chlorides of potash and soda are thus removed, leaving in solution sulphite, hyposulphite and some carbonnate of soda, together with the iodides and bromides. By the addition of sulphuric acid the first three salts are decomposed, and the sulphate produced is removed by crystallization. The concentrated mother-liquor is acidulated with sulphuric acid, and after the addition of binoxide of manganese, the iodine and bromine distilled off. The reaction may be represented thus :

$$NaI+MnO2+2(HO,SO3)=NaO,SO^3+MnO,SO_3+I.$$

The bromine of commerce was derived mostly from salines until the salt mines of Stassfurt were opened ; the Schoenebeck salt springs, near Madgeburg, producing the greater part of the supply for Germany. The method of manufacture is similar to that followed in the separation of iodine.

Upon opening the mines of Stassfurt, bromine was found in the mother-liquors in considerable quantities, and at present the principal part of the European product is derived from this source. As high as 300 grains per gallon has been obtained from these mother-liquors. Although but two or three of the manufactories at this place have economized this substance, the price of bromine has greatly decreased during the last five years. This decrease has been hastened by the large production of bromine in the United States.

Although the amount of bromines in the Saratoga waters is considerable, yet the comparatively limited flow of water here, and the large consumption of those waters for medicinal purposes, precludes the manufacture. But from the strong salines our supply is derived in large quantities. At Tarentum, Sligo, and Natrona, in Western Pennsylvania, Pomeroy, Ohio, and Kanawha, West Virginia, the manufacture of bromine has become of considerable importance. The production of 1870 will reach 125,000 pounds, a quantity probably in excess of our consumption. In 1867 the Stassfurt product of bromine was nearly 20,000 pounds.

The total product of iodine in Great Britain and France is about 200,000 pounds annually, and outside these two countries very little is produced. As the average product of iodine is about ten pounds to the ton of kelp, and it requires twenty tons of wet weed to produce one ton of kelp, this total product represents the burning of 400,000 tons of sea-weed. At the present price, the iodine produced is of more value than the alkaline salts, which were the original object of the industry.

As previously stated, iodine is not produced in the United States. Since its use was first established here the price has fallen from $16 to $5 per pound. At present, bromide is furnished for less than $1 50 per pound.

The chief consumption of iodine and bromine is for medicinal purposes in the form of iodides and bromides of potash, soda or ammonium. A small proportion is consumed in photography. Bromine has been proposed as a discharge in calico printing, and during the late war was to some extent employed as a disinfectant. As yet but a small proportion of the bromine of the saline mother-liquors is economized, but should manufacturers turn their attention to this important substance, the consequent reduction in price will render its economical employment in other directions possible.—*American Chemist.*

Waste in Management of Rolling Mills.

THE time will come in the business of iron-making in this country, as it now is in the older countries, when the chances of profit will depend as much on the closeness of management in the details, and careful economy of material, as in the production of large quantities. The production of large quantities is only the most profitable where the cost by waste and other attending circumstances is not allowed to proportionately increase ; better were it to have a limited business well handled, and fair profits, than a large, unwieldy business, that leaves the proprietor in doubt as to profit, from beginning to ending of the year. Every practical rolling-mill man is acquainted with some of the great causes of waste in iron-making ; but it is surprising, at times, to find to what a limited number of causes their knowledge is confined. That a certain quantity of finished marketable iron should be produced from a given quantity of metal, ought to be the law of management in every rolling mill, and that when the production falls below its proper proportion, that it would at once lead to a search for the cause, should be the practice. If a plate or bar of iron is wanted of a certain size, finished, or a ton of rods to a certain length, the quantity of iron to produce it should be closely calculated to be only sufficient to do so by careful use and management ; no surplus should be allowed for extravagant waste in working, and should the result prove unsatisfactory, after the proper knowledge and careful handling of it has been exercised, then let there be an inquiry and examination made, and increased profit will be the reward.

With good material, the employment of good workmen, and the use of good machinery, the manager is left wholly responsible for loss by waste or small profits from the limited production. Among the most common causes of waste in rolling mills is the persistent use of furnaces after they have ceased to work well and economically—allowing them to have been at first rightly constructed. The waste in fuel by improperly constructed furnaces, as well as the waste in iron, both in the puddling and heating furnaces, is hardly less common than the first mentioned cause. The practice of weighing the coal delivered to each furnace, that has been adopted by some of our mills, exhibits practical wisdom, and is well worthy of general adoption, as it shows the deterioriation of the furnace from week to week. We notice with interest that some of our largest rolling mills have turned to good account what has heretofore been only a matter of waste : that instead of throwing the cinders from the furnace ash-pits into the river, they have them thrown into a large "bosh" of water, from which they are carefully sifted of all but the clean cinders, which are returned for use, and are found to be worth in value more than one-half of what the coal costs from which they were produced—a fact that reminds us that the proprietors in England, Scotland, and Wales are finding it profitable to go back over the vast heaps of refuse of the earlier iron workers of those countries, that have accumulated to the extent of entire fields, and are now, with modern knowledge and facilities, producing from this refuse a large yield of a fair quantity of iron, and that at some future day it will be the profitable practice to utilize much that is considered worthless or unimportant by our present iron workers.

Again, we repeat that the time will come when the profits of our rolling mills will arise more from close economy and management in what are now considered unimportant details, than large profit from large production, as at present. What vast amount of iron is worked over in the shape of scrap from "croppings" that has already received the necessary amount of work to fit it for the market. A certain amount of such scrap, fixed on by the observation of iron skillfully worked, should be the allowance to every bar, rail, plate, or ton of finished iron produced. Intelligent practical foreigners frequently speak of the extravagance shown in the management of most of our rolling mills, in the indiscriminate use of material, and allowance made in suiting the quantity of raw material to the quantity of iron wanted ; the proportion of allowance being very much greater here than in the older countries, with no reason for it only our American view that from our wealth in minerals we can afford to be extravagant. The percentage of waste in most of our mills is entirely too great, and one of the causes is because accurate statistics are not kept to warn and teach, by experience, what to reject and what to adopt and follow. Nothing like figures based on actual practice to make one familiar with his business. Let furnaces be adapted to the kind and quality of fuel and stock used ; a matter that does not receive the attention in this country that it does elsewhere, as we find that in two different mills in Wales, both working metals from the same furnaces, but using different coals, the area of the grates at one mill are eight feet, while at the other grates were adopted having an area of ten feet. These two mills are owned by the same company, and the reason for the difference is based on experience and close observation. And also we find at the same two mills the largest area of flue was given that which had the smallest area of grate ; each being best adapted to the coal used, the one mill using a semi-anthracite, and the other a highly bituminous quality. It is the close observation and accurately-kept statistics in matters of this kind that make the intelligent manager, and add to the profits of the business. Metals are very different in their nature, and no small amount of attention should be given to their applicability to the purpose in view, so that an article made of proper material which ought to last four, six, or ten months, and others that ought to endure the wo ing of fifty, one hundred or two hundred tons, should do all of this, or the reason of failure be apparent. The economy of rolling mill management is also found in systematic management ; a reason for adhering to old plans and processes, as well as for adopting new ones, should guide the mind of the manager in his control of affairs. Although not always attainable, the information as to the purpose of the iron to be made would enable the manager to produce iron often better suited to the wants of the purchaser, and with more economy in its manufacture, than in the blind and indiscriminate manner generally practiced in receiving and fillling orders. A growing practice with rolling mills, within the past few years, is to adopt and manufacture some specialty closely allied to iron making, and by adapting the quality of iron made to its purpose, a better article is made than if the specialty was made a business separate from the rolling mill. The rolling mills, in such cases, can produce iron of a better quality for the purpose, and often at less cost, than when manufacturing for the general market, and, as we have said, with a saving of much that would be lost were the manufacture of the specialty carried on by purchasers of iron. The waste of gases, the unnecessary burning of fuel, the lessening of the amount of scrap attending the manufacture of iron, and the more economical use of furnace building material, are subjects for careful attention that will be rewarded by a successful paying business. We venture nothing in saying that a knowledge of these things, on the part of the manager, often makes the difference between a profitable and an unprofitable business.—*Pittsburg Review.*

THE MISSOURI SCHOOL OF MINES is located at Rolla, Phelps county—the bid being $130,545 against that of $113,500 from Iron county. The following minerals are known to exist in

helphs county: Iron of three varieties; lead, copper, manganese, cobalt mineral paint, nickel, zinc, gypsum, arsenic, limestone, white and variegated sandstone, marble, quartz, kaoline and granite. The buildings for this school of mines and metallaagy will cost from $75,000 to $100,000.

A Whole Island of Silver on the North Shore of Lake Superior.

We have before alluded to the Silver Island of the North Shore of Lake Superior, in the British Possessions, just below Thunder Cape, and some fifteen miles beyond Fort William. The island is quite small in dimensions—say one hundred feet by forty—and the most of it submerged at high water—a small part at one end is about eight feet above the lake level. This island was entered by the Montreal Mining Company, as part of a track embracing 108,000 acres; and the island was subsequently purchased of them by Captain William B. Frew (formerly of Portage Lake, and Superintendent of the South Pewauuic Copper Mine), for himself and associates, including among them Major Sibley, of New York, a brother, we think, of General Sibley, of St. Paul.

The Montreal Mining Company first made the discovery that the island contained silver, and by their agents sunk a shaft on the island; but these knew little or nothing about mining, and the water coming in upon them, further working of their mine was abandoned as useless. It was only this last summer that Captain Frew and his company completed their bargain with the Montreal Company for the island, and secured it by paying, or agreeing to pay, $250,000 for the entire 108,000 acres. They went immediately to work at improving the mine in a "workmanlike manner." Their first step was to surround the island with cribs of timber, filled with stone, to serve as a breakwater and ice-breaker; and within these cribs a coffer-dam was built, and puddled with clay, having the effect of making the whole interior of the island nearly water-tight, at least from the intrusions of the lake. The next step was to set up two large syphon pumps worked by steam, by which the inside was pumped dry, or nearly so, and it has since been found that a very little working of the pumps daily keeps the island clear of water entirely. They then went to work laying bare the vein, and now have exposed sevent feet in length, and find it to be a true fissure vein, with perpendicular walls—the vein or silver matrix being calcareous spar with some little quartz intermixed. The vein is eight feet wide, and eye witnesses from there state that for one-quarter of this width it will average seventy per cent. of pure silver. On the first trial, after the water was gotten out, six men took out over $35,000 worth of silver in four days; and up to the latest accounts the working has been continued at about this rate. Already one hundred and twenty-three barrels of native silver, estimated to be worth $70,000 to $100,000, have been shipped. The yield of the mine, computing by the ton, is not less than one dollar to the pound! The mine employs now about forty men, and will increase their force immediately.

The "royalty" paid on this to the English Government is quite small—not exceeding one-twentieth. Eye-witnesses of intelligence, judgment and experience, report that Captain Frew will probably take out of silver, up to the opening of navigation next spring, from $1,000,000 to $3,000,000 in money value! The steamer "Meteor" conveyed down the lakes, on her trip before last, sixty-two barrels of silver. This silver island is no humbug, but an actual bona fide affair, in which the most wonderful results have already been obtained, and all bids fair to make it in yield and richness the most remarkable mining discovery in this country for many years. Some masses of silver went down on the "Meteor," larger and heavier than a man could lift. A part of the island vein, say two feet of the eight in width, is wonderfully rich, and it is from this portion that the larger silver masses are extracted. Other rich mines of silver are reported as having been found on the main north shore in the range of the silver island, and Captain Hodson, of Portage Lake, has gone East to organize a company to work them.

Much excitement exists around the shores of Lake Superior over this wonderful development of argentiferous wealth. And doubtless, now that the mind of the experienced mining world in this quarter is directed to the subject, much "prospecting" will ensue, and further discoveries be made.

It is already mooted in Duluth to make an effort to reap some of the advantages from this wealth of silver, by being its winter supply point, through the construction of a practical wagon road for one hundred and fifty miles down the North Shore, through St. Louis and Lake counties to the international line and beyond. The next Minnesota Legislature will be applied to for an act authorizing a State road in that direction, and the issue of county bonds by Lake and St. Louis for its construction.—*Duluth Minnesotian.*

McCracken Gas Process.

Recently we had the pleasure to visit New Brittain, Conn., for the purpose of examining the McCracken gas process, which is in operation in the gas works situated at that place. New Brittain is a very pretty and thriving manufacturing town of about 11,000 inhabitants. The gas works are near the rail read depot. The retort and purifying house is a substantial brick building with a slate roof, supported by an iron frame. A wing, also of brick, has the metre room and office, and also includes an extemporized photometric room, ingeniously devised by Mr. E. D. McCracken, in order to test the candle power of the gas made by his improved process. There are two gasholders; the old one of 15,000 cubic feet capacity, and a very nicely-proportioned and well-constructed holder of 410,000 cubic feet capacity, just completed by the enterprising contractor, Mr. T. F. Rowland, of the Continental Iron Works, N. Y. The retort house contains one bench of clay sixes, and one bench of iron threes. The bench of threes is provided with the McCracken improvement for utilizing the tarry products described in the last number of the *Journal.*

The courteous and intelligent young engineer, Mr. E. C. Learned, and his assistants, gave us the opportunity to see the *modus operandi* of the process, which is much more simple than we anticipated. Although previously prepossessed in favor of the *theory* of the improvement, we will confess that we expected to find, as is usual in the first trials of new inventions, crudities in the mechanical arrangement, and, possibly, serious if not vital difficulties to the practical every-day working of the process. The history of the heretofore numerous futile attempts to utilize coal tar to increase the volume and candle power of gas, both in this country and in Europe, and especially in England, since the first effort of Mr. Low in 1820, will account for the skepticism in the present instance. But to our most agreeable surprise, we could detect none of the old evils in the process. There is no choking up of stand-pipes and connections, no conglomerate of coke and solid matter in the tar retorts, and no accumulation of gas carbon. The tar retorts and connections were quite clean after over two months' use, while the retorts, working as usual, had considerable incrustations, and the superintendent informed us required "burning out" once in two or three months. The coke of the tar retort was quite as good, if not better, than in the other retorts, being compact, hard, and with quite a metallic lustre when broken. We have a sample at our office that will show for itself.

The apparatus is simple, and its application requires but little expense, inasmuch as it requires no change in the ordinary settings of the benches. The tar is evidently completely utilized and converted into illuminating gas as fast as it is formed, largely increasing the volume and illuminating power of the gas. The most casual observer cannot fail to notice the high candle power of the gas, and especially the peculiar whiteness of the flame, evidently owing to the excess of olefiant gas and possibly acetyline, which it derives from the *decomposition of the tar in combination with the superheated steam.* We italicise the latter part of the sentence, because it is the great secret of the success of Mr. E. D. McCracken's process—the key to the enigma which all prior experimenters have sought for in vain. Taken all in all, the trip, despite the stormy weather, was pleasant and instructive. The town is neat and picturesque, the air pure and bracing, and last but not least, Mr. Ross, of the Humphrey House, the boniface of "mine inn" where we dined, is not only genial and agreeable, but a splendid caterer, and thanks to distance, is not dependent upon the stale products of the Washington Market of New York.—*Gas Light Journal.*

Mining at Home and Abroad.

The difference between European and American mining is immense. Every European country has been rummaged, scoured, screened and washed for mineral, for thousands of years. Coal lies thousands of feet below the soil; all the rich seams of metallic ores, excepting iron, were exhausted centuries ago by the wasteful, barbarous smelting of old and mediæval nations, and the poorer lodes, which would yield to more refined processes a scanty margin of profit, have been chased downwards into the bowels of the earth, beneath the sea, or into the cores of the mountains, where the pump can do no more, or where the volcanic heat of the earth foretells the final barrier. Thus, every century has increased, and will continue to increase, difficulties which have now become enormous and full of imminent peril. To conquer them requires the highest resources of the engineer, the utmost intelligence of the geologist, and the best skill of the mechanic. How different in America! Our coal lies upon the surface, and the getting it is scarcely more than quarrying it. It lies in seams quadruple the thickness of those in England, cropping out on the mountain sides, where we go up to get, instead of down. Our iron lies in the form of rich magnetites, and ninety-eight per cent. hematites, in the bluffs overhanging the river and lakes which will float it to the blast furnace, and single seams will yield, by surface or gallery or pit mining, hundreds of millions of tons. Our copper is dug native, within reach of the daylight; our galena has just earth enough over it to keep it from the malign influences of the air, and our silver is still extracted without the aid of prop or column. Gold, it is true, is an exception, and is now chiefly mined in shafts and subterranean galleries. You will appreciate, then, that the functions of our mining engineer are less difficult, and of a widely different nature from those of the European. His methods are less uniform, and are governed entirely by circumstances which vary with almost every metalliferous deposit. Hence his engineering requirements are of a lower order, less costly, with less of construction and more of mechanical appliances, less of skill and more of rude labor, and the readiest adaptation.

Another marked distinction is this: The American miner must also be a good metallurgist. In Europe it is believed that the miner has enough to do and to think of in getting the ore, without troubling himself about what is to become of it. This accords well with the tendency to extreme division of labor prevalent in Europe. It is seldom that single establishments, like Krupp's or Schneider's, comprise consecutive processes from the ore to the finished product. But even these somewhat exceptional establishments are so colossal in their extent that they too must refine the division of labor, and establish a sort of industrial world and economy within themselves, so that the principle still holds good. In the great iron industry the tendency has been and still is towards great variety in the products of the blast furnace, and the adaptation of special brands of pig to special purposes. Take a steam engine; forty years ago it might all have been built from the product of a single blast furnace; now it is more likely to require iron from a dozen. One brand is suitable for bed-plate, another for frame, a third for cylinder and steam-chest, a fourth for conversion into wrought metal for piston and connecting-rods, and still other varieties for the many other kinds of stress. In short, the gist of the whole matter is, a mining engineer must know both how to get ore and what it is good for; must be both an engineer and metallurgist. If the vein changes its character, he must know how the change will affect the furnace and the resulting products. As a consequence, the studies he should pursue must not be merely those relating to engineering, but they must be metallurgical also. His engineering requirements will seldom be such as to demand much of the higher mathematics—with a solitary exception to be pointed out hereafter. But he must be an expert geologist and mineralogist, and must have a substantial working knowledge of physical science, and an extensive knowledge of chemistry and assaying.—*Renssalaer Polytechnic Institute Report.*

Perpetual Motion.

In speaking of the volume *Perpetuum Mobile*, by Henry Dircks, recently issued in a new edition, *Engineering* says: "It is undoubtedly disheartening to find that, during the years 1860 to 1869, inclusive, there should have been taken out, in this country alone, upwards of eighty patents for 'perpetual motion;' and especially is it dispiriting to notice that numbers of these patents have been taken by men who, from their position in life, must necessarily have received a fair—if not, indeed, a first-class—education. On the other hand, however, it is satisfactory to know that whereas in former times there were numbered amongst the searchers after 'perpetual motion' men of high standing in their professions, we find now-a-days that these would-be inventors are, with rare exceptions, 'nobodies,' or, in other words, men who, if their names did not come before the public in connection with some absurd scheme or other, would never come before the public at all. There is certainly some consolation in this, and it is equally satisfactory to notice that, even by the professional portion of the public, schemes for 'perpetual motion' are, in the main, now received with the incredulity and contempt they so heartily deserve."

New Machinery Depot.

The Wood & Mann Steam Engine Company, to give greater facilities to their increasing business, have opened an office and depot at 42 Cortlandt street, New York city, which will be under the personal charge of the President of the company, Mr. E. D. Wood, where he will be prepared to furnish estimates and plans with the same facilities that they have been heretofore offered at their works in Utica. Mr. Wood is a consulting engineer and a practical draughtsman, and will have facilities for making estimates and drawings unsurpassed by any other parties. The company will constantly keep a full assortment of their machinery at their New York city depot, and will be prepared to fill orders promptly and satisfactorily,

MINING SUMMARY.

Colorado.

THE WESTERN SMELTING WORKS.

"These works, of which we have made mention from time to time," says the Central City *Register*, "are now in full operation. The roasting kiln and the calcinating furnace, a combination of the upright and reverberatory, have been in operation for some time, and recently the upright smelting furnace was charged and fire applied. Within a day or two we shall give a full description of these works, and therefore at this time shall only say that we found them in apparently successful operation, smelting the ores of the Running and Fisk lodes at the rate of ten tons per day. The managers, Messrs. Congdon and West, seem to be satisfied, though not elated, as they have expected to succeed. The ores of the running lode are admitted by all to be as difficult ore to smelt as can be found in the Territory, and no difficulty has been found in their treatment. They had out already a pile of one and a-half or two tons of matter, to which they are adding every four or five hours. The slag flows in a continuous stream, clear and limpid. If there is any reason why these works will not prove a complete success, it is not apparent to the observer. There is no indication of failure in any part of their process. Mr. West informs us that pine-wood charcoal works far better than he anticipated, and nearly, if not quite equal, to hardwood coal. They have in the yard quite a plenty of ores that have heretofore not been worth mining. We have endeavored to speak very moderately about these works, but cannot help saying that they look like a big success. The only criticism we have to offer is upon their plan of buying ores. Instead of buying at the lowest figure that will bring them, they are offering at the start all they can afford to pay—a system we have never seen tried in Colorado."

GRAND ISLAND DISTRICT.

The *Register*, having visited and inspected some of the most prominent mines of this new district, reports as follows: "This district was first introduced to the public in June last, when, as now, the Cariboo lode, because most developed, gave reputation and character to the whole district. Our first visit was to this lode. It is located nearly up to the timber line, on a gradual slope extending from the grassy valleys and parks of the boulders and their tributaries to the lofty summit of the dividing ridge of the great Rocky Mountain chain. It lies up in this thin air, exposed to sunshine from earliest sunrise till late in the afternoon. Few mines are as accessible. The rocks are somewhat friable, and mostly composed of feldspar and quartz, furnishing, when decomposed, the best possible material for roads. At moderate cost a highway has been built, connecting with the Central and Ward district road. The ascent is gradual, and the whole road there from this place is the best in the mountains of Colorado, the only steep and long hill being just behind Black Hawk. The mines run nearly east and west, and is quarter of a mile from the town. It has a shaft-house 30x130 feet. We found the main shaft 105 feet deep. At a depth of fifty feet, a horizontal drift, commencing at the main shaft, runs each way, and is in the aggregate 260 feet long, connecting with other shafts. From this drift the ore has been back-stoped to the surface. At a distance of 100 feet east of the east end of the drift is a shaft, which, at a depth of about fifty feet, struck a fine body of ore, while 200 feet west of the west end of the drift, is another shaft forty-five feet deep, also revealing a fine vein of ore, an average from which assayed $94 15, making the total distance for which the vein has been opened 560 feet. At the bottom of the main shaft another

drift has been run some thirty feet. We are assured that throughout the entire sinking, drifting and stoping, the rich vein of ore which has given fame to the mine, at no time disappeared. Even now it can be readily traced throughout. During the first fifty feet of sinking it seemed very questionable whether the mine were a true The crevice pitched to the north at a high angle, presenting no defined walls, often following the strata of the country rock, which was greatly broken, requiring constant timbering. At a depth of about fifty feet the crevice turns downward, nearly or quite perpendicularly, the crevice cutting clearly and definitely across the strata, thus, as already stated, establishing the mine as a true vein. The walls are solid, the south one being well defined, while the north one is still nearly covered with second and third-quality ore. The ore-vein averages five and a-half feet, the vein of first-class ore averaging, from the commencement till now, about two and a-half feet. The first work was done in '69, when twenty-five tons and 1,664 pounds were taken out and sold to HILL, assaying 2,475.1 ounces. Amount taken out and sold this year, up to November 1st., 285 tons, 1,648 pounds, assaying 31,293.3 ounce. Total, 34,368.4 ounces; coin value, $44,678 92. Since November 1st about sixty tons have been taken out. The assay figures doubtless show the real value, as they are those by which Professor HILL purchased the ore. This ore was from the two and a-half feet of the vein herein mentioned as first-class, but from it had been selected three tons of ore yielding an average assay of $5,000 per ton. Were this added to that sold, the avarage would be upwards of $200 per ton. The lower-grade ores, occupying an average of three feet of the vein, have been repeatedly assayed, yielding an average assay of $60 per ton. The first-class ores are being carefully selected, the best laid aside for experimental treatment, and the balance hauled eighteen miles and sold to Professor HILL; while the lower grade is either left standing in the mine or thrown aside to await the erection of works. The average yield of the ore thus far taken out was greatly reduced by the broken character of walls and vein near the surface, which caused the ores to be greatly mixed and prevented assorting. The ore grows constantly richer as greater depths are reached, and at the bottom of the deepest shaft is better, both in quantity and quality, than in any other portion of the mine. Along the north wall of the vein is a soft gouge, often containing a good deal of hornblende, but this also assays ninety ounces. Six men only are employed in the mine, four by day and two by night. When the whim, now being erected, is complete, it is expected, without increase of hands, to raise eight tons of ore per day or more, if the lower-grade ores are taken out. Just south of the main shaft a spur has been opened, having a crevice of about twenty inches, which assays as well as the balance of the ore. Preparations are being made to run a tunnel, which shall strike the vein, 300 or 400 feet below the surface.

"Near the Caribou we visited the Pride of the West, a vein about four and a half feet in width. This mine is not being worked, but shows some very fine-looking ore, carrying considerable green carbonate of copper. This mine certainly promises well. The Staten Island is another which has been sunk to a depth of fifty feet, producing specimens of fine ore. Near by is a vein of polarized magnetic iron ore, or, in common parlance, lode-stone. The ore has strong magnetic power, picking up as high as three shingle nails in a string.

"The Idaho lode, half a mile or more from the Caribou lode, has a shaft on it four and a half feet by ten, and thirty feet deep. From this shaft have been sold to Prof. HILL the following lots:

	Ounces.	Ccin value.
3.25 tons assayed	874	$1,136 20
0.56 " "	103	133 90
6.5 " "	997.5	1,296 75
4.35 " "	522.4	679 12
1.28 " "	618.2	804 66
15.94 " "	3,115.1	$4,050 63
Average per ton	195.4	254 10

"The ore vein is five feet in width. The ore sold is claimed to be an average of three feet of the vein. The remaining two feet assay, 110 ounces, or $143 coin. This mine is not worked, because the young men who own it prefer to spend the winter in visiting their friends east, and in enjoying themselves generally. The Jo Thatcher lode is close by, and has remarkably fine walls, with perpendicular crevice, four and a half feet wide, and fine-looking ore, reported to assay $230 per ton. The ore is largely quartzite, but carries sulphuret of silver. The shaft was thirty feet deep. Many other lodes in this vicinity, including the Pewarmer, the continuation of the Idaho, show finely, but we were unable to obtain definite statistics. Lower down the mountain, by the roadside, is the Trojan, owned by HINDS, CAMERON, and others. It has a shaft fifty-four feet deep. No more clearly defined walls can be found in Colorado, and no mine which is more clearly a true vein. The strata of the walls show very plainly throughout. There are twenty-two inches of ore, carrying sulphide of copper, zinc, lead and silver, together with a quartzite gauge. This ore carries about $90 per ton in gold and silver, and is piled up to await works nearer the mine. By the side of this ore vein is a crevice ten inches wide, of decomposed material or dirt, which is sold to HILL at Black Hawk at from $96 to $126 per ton, currency. The ore vein has never failed for a moment since mining was first commenced. Few mines ever promised better. This vein has been struck for over two thousand feet, and is perpendicular. Many other mines are worthy of notice, but those mentioned serve as an index of that immediate region. The mines are as numerous as those of Gilpin county, and promise brilliant things for the future. Northward, the mines change in character. A sample of ore shown us by Dr. MANN, antimonial copper glance, with green and blue carbonate of copper, looked very finely. This mining region, doubtless, extends northward to Long's Peak, and perhaps farther, and will be heard from hereafter. It is worthy of a more extended notice now, but we have neither time nor space."

THE WAR IN THE MINES.

The Central *Register* of the 22d contains the following particulars of a shooting affair in the prize mine. It says: "The long difficulty about the Prize and Seuderburg lodes culminated yesterday in the wilful and deliberate shooting of Thomas Gleason, the mining captain of the Scudder party. The controversy turns upon the question whether certain ground, which both parties claim, is the Prize or Seuderburg. Upon this we express no opinion. Some weeks ago the Prize party obtained an injunction against the occupation of the Prize by Messrs. YOUNG and P. LEYDEN. Last Saturday an injunction was obtained restraining SCUDDER and party. Yesterday morning GLEASON and some others went down the Scudder shaft, which communicates with the Leyden shaft. When down about 200 feet, they were called to halt, the party below saying they were there to hold the shaft, and were going to do it. After some parley, GLEASON and party continued down the shaft, when a man by the name of THOMAS SHANNON shot GLEASON with a gun, the ball striking him in the hip and passing into the abdomen. It is supposed the ball pierced the bladder. Mr. GLEASON is still living, and under the care of Dr. ADUDDELL. The doctor is unwilling to express an opinion as to whether he will live or not until to-day. We have always known Mr. GLEASON as a peaceable, quiet man, and exceedingly regret that he has met such a fate. While we have nothing to say of the merits of the controversy, which will be settled in court, we say without hesitation that there can be no possible justification of this shooting business. It has been charged that GLEASON, by entering the shaft, was violating the injunction; but even if he were, it is no excuse for an attempt to kill him. SHANNON has been arrested, and is now in jail. As the Grand Jury was adjourned by Judge BELFORD, to meet again on the 5th of December, we presume SHANNON's case will be considered this term."

Nevada.

THE COMSTOCK.

The San Francisco *Commercial Herald*, Dec. 2, says: "A very marked degree of activity prevailed in the mining stock market during the past week, and the improvement in prices has been very general. As will be seen in our statement of sales hereto annexed, Savage and Yellow Jacket sold to a large extent at advanced rates, and that Original Hidden Treasure has been well maintained under nearly equally large sales. Altogether, the market has acquired increased firmness, with a stronger disposition on the part of outsiders to make speculative investments. Chollar-Potosi sold largely at a slight decline from opening rates. They extracted 1,750 tons of ore during the week ending Nov. 26th, against 2,124 tons the previous week. The assays for the previous week gave $70 40 to the ton, and $59 55 per ton for the week under review. The depreciation of the ore is due to the lessened value of the yield from the top workings of the Belvidere stope, which locality has also produced a smaller quantity than during the previous week. The west drift from the new shaft has been extended 49 feet during the week. Hale & Norcross has been in light demand at rather uniform rates. For the week closing, Nov. 26th, the ore yield amounted to 830½ tons, against 430½ tons the previous week. They have on hand in their dumps 6,913½ tons. Savage was in the market to a very large extent, selling at fluctuating prices, and closing at improved rates. They took out 715 tons of ore during the week ending Nov. 26th, valued at $14,339, equal to $20 05 per ton. Overman has been in light request. During the week ending Nov. 26th, 558 tons of ore were extracted against 515 tons the previous week. Crown Point sold to a considerable extent. For the week ending Nov. 29th, 376½ tons were extracted, valued at $27 69 per ton. The incline has attained a depth of 136 feet below the 1,160 level, and the south drift is in 228 feet. Golden Chariot reports a bullion yield of $52,826 up to the 25th November.—The Original Hidden Treasure Company is raising about 60 tons of ore per day, said to be of very good value. Meadow Valley has received thus far $93,900 in bullion for November account. Segregated Belcher levied an assessment of $1 per share on the 19th of November. Gould & Curry has been in less favor. For the week ending Nov. 23d, 471½ tons of ore were extracted, showing an average assay value of $49 36 per ton. Sierra Nevada sold to a larger extent than usual. The mine is reported to be improving."

STEPTOE MINES.

A short time since, says the Elko *Independent*, December 7, we published an account of the Steptoe mines, situated in the southern end of Clover Valley. Reports of the richness of the mines and remarkable facilities for working the ore continue to come to us. Yesterday we were shown some ore from the Toyabit and McLaughlin mines, which, in apparent richness, equals the best from White Pine. Some assays have reached $3,816 per ton. The work on the Toyabit is being prosecuted under the superintendency of Mr. E. SCHULLER, an old and experienced miner. The company is known as the Nevada Land and Mining Company, incorporated in San Francisco. The Cave No. 2, owned by OSBORNE & MCLAUGHLIN, shows rich galena. One of the advantages of the district is its heavy timber, which, added to the well-known fertility of Clover Valley, will render that place far more agreeable as a place of residence than most mining districts.

FROM SILVER PEAK.

Mr. WM. BLACK, from Silver Peak, represents matters there, according to the *Reveille*, as quiet, Mr. MARTIN'S mill having stopped for the present. Mr. B. went to the Peak for the purpose of doing some assessment work on ledges belonging to Coroner STANSBURY. While doing this he took nine tons of ore from one of them called the Lodi, which he took to Mr. MARTIN'S mill, where himself and the man in charge "got up steam" and run the lot through. The yield in gold and silver is a little over $210 per ton, which paid for the assessment work and a good deal over. This ledge is situated only thirteen miles from the mill now being built by Messrs. MCGLEW & DAWLEY in the Montezuma district. The forty-stamp mill of the Red Mountain Company was stopped a few weeks ago. The company intend to increase the number of stamps to one undred.

BULLION SHIPPED.

WELLS, FARGO & Co. shipped from Austin, on the 8th and 9th instant, eighteen bars of bullion, weighing 1,584 pounds, and of the value of $21,543. It was consigned to LEES & WALLER, New York, being the product of the Manhattan Company.

Michigan.

THE NEW MINES AT NEGAUNEE.

The Marquette *Mining Journal*, December 10, has the following account: "'It never rains but it pours.' Late in the summer, WM. C. MCCOMBER leased the Pendill farm, adjoining the village of Negaunee on the south, and proceeded to open a most valuable deposit of hematite, from which he has already mined and shipped about 5,000 tons of ore. EDWARD BREITUNG, Esq., followed suit by leasing of C. T. HARVEY about 1,300 acres in the same locality. The existence of good ore upon the HARVEY property has been known to Mr. BREITUNG for a number of years, from explorations made by him in 1867, and it appears that he has been working hard ever since to keep the fact quiet until such time as he could secure for himself the benefits to be derived from the knowledge thus obtained. Since obtaining a lease of the lands, extensive explorations have been made, revealing the presence of immense beds of a peculiar, but at the same time most valuable, soft hematite, and for the past two or three weeks the excitement among the good citizens of Negaunee has been very great, all who were able desiring to secure leases under Mr. BREITUNG. Rough maps of the property were made, and, armed with pick and shovel, scores of excited individuals have thronged the hills and valleys, until the thirteen hundred acres present more the appearance of an exaggerated pepper-box than anything else we can think of. Mr. BREITUNG was besieged day and night by eager and excited prospectors, for this 'forty' and that 'eighty,' until the whole has been taken by at least a dozen different individuals or firms, all of whom appear certain of having secured an immense fortune. That some of them will succeed in developing good mines, we have very little doubt; that all will realize their expectations is scarcely probable. The Grand Central Iron Company (WATERMAN, BEAVER & BURT) have taken 120 acres of the property nearest the village, and have a force of men at work, with the very best indications for a good mine. Their opening is in the side of the hill just opposite the Pioneer furnaces, and they are now mining and loading nearly a hundred tons per day. The opening is but a short distance from the Peninsula Railway track, and mining operations can therefore be carried on with the greatest facility, and without the usual preliminary expense of side tracks, etc. On the opposite side of the hill from the Grand Central mine, JACOB HOUGHTON, Esq., has pitched his tent, and most happily too for himself. Here we found the best show of ore yet developed on the property. Work has been commenced at the base of the hill, and to such good advantage that a number of cars were loaded the first day. The ore is of good quality—equal, we think, to any in the district—and the deposit appears to be almost unlimited. It is continuous with that of the McComber mine, of the great value of which there is no longer any doubt. LONSTORF & MASS have eighty acres at and around the Eddy slaughter-house, and have a force of men at work in a pit which shows well. They have the ore, but whether in as great bulk as may be desired it is as yet impossible to say. The gentlemen themselves, however, aver that they have an extensive deposit, fully equal to any other on the property, and we rather incline to the belief that the work now being done will prove their assertion correct. In addition to the above, JOHN L. SPURR, Esq., has taken and is exploring 120 acres; T. H. LEARNED & Co., 120 acres; NORTON & RAMER, 80 acres; JOHN R. CASE, 80 acres; GEO. SHELDON, 80 acres; VOELKER & Co., 160 acres; JACOBSON & DOWNING, 120 acres; HEYN & Co., 80 acres. All these parties have forces at work exploring, and all are confident of developing something valuable. There are, perhaps, a hundred men at work on the property, and we shall not be astonished to see five times as many next summer. So far as our observation extends, we feel warranted in saying that there will be at least four mines working south of Negaunee next summer—the McComber, Grand Central, Houghton and Lonstorf; while the prospect is good for a number of others. The benefits which Negaunee will derive from this new discovery can scarcelvy be over-estimated. It gives new life to the place, and we shall not be astonished if it doubles its population within the next two years. We hope it may. Anything which directly benefits one portion of the community indirectly helps the whole of it."

Montana.

NEW DITCH ENTERPRISE.

The Deer Lodge *Independent*, of Dec. 10, says: "We have heard a project spoken of, having for its object the supplying of the mines of Gold Creek country with a more abundant supply of water. It is proposed to take the water from the Deer Lodge river, near the mouth of Warm Spring creek, and convey the same along the foothills to the bars at and near Pike's Peak. As this is the only source from which an abundant supply of water can be obtained to successfully work these mines, we hope the project will be successfully carried into execution at an early day. The ditch probably would cost $150,000, but there is no doubt that it would be a profitable investment. There are acres of ground in the Gold Creek country that propect well, but they cannot be developed for want of water until the mines now opened there are exhausted, which, good judges think, will not be at an earlier period than ten years, and some even claim that it will take double that time. We are informed that some good prospects have been obtained near the line of the proposed ditch, several miles this side of Pike's Peak. There is no doubt there is much good mining ground all along the foot-hill, from a point due west of this city to Gold Creek, and perhaps beyond that point. There is much of the table or bench lands in this valley that would make excellent farms, if water for irrigation purposes could be obtained. This ditch could be made sufficiently large to carry enough water for agricultural and mining purposes. Those familiar with the history of such enterprises in other countries will readily concede that this promises to be among the most valuable properties in Montana. The great breadth of arable land, and the known-to-be rich and extensive mines that it will reach, should induce men of capital to invest their money in this great work. It would begin to yield a revenue after five miles were completed. The greater portion of the way of its course would be over a splendid country for ditching, and the balance of the distance is what might be termed fair ditching-ground. The length of the ditch would be in the neighborhood of forty miles, the first twenty of which could nearly all be plowed and scraped, thus materially lessening the cost of construction. At no distant day the demands of the country will make this work an imperative necessity, and if it is not built the coming season, it cannot long be delayed. Its construction would add thousands to the wealth of this country, and millions to the wealth of the nation."

British Columbia.

THE PEACE RIVER MINES.

A letter appears in the *Bulletin*, of Nov. 29th, from which we quote: "The scene of the last discovery was a large creek, called Germansen creek, seventy-five miles northeast of Vital creek. It empties into Ominera river, a branch of the Findlay. A well-defined trail exists between the landing on Lake Tetlah and Hoganville, sixty miles. Lake Tetlah landing is the junction of the two routes from the lower country—one by way of the Fraser river valley, and the other *via* Skeena river. The miners of Vital and Silver creeks, with the exception of three on each, decamped for the new diggings immediately upon receiving information of their discovery. These diggings have the reputation of being shallow and rich. About four miles of the creek has been taken up, and it all proves of a similar character, ranging from three to six feet in depth. The miners who have communicated with their friends give flattering reports, but those who have temporarily returned to Cariboo are reticent According to statements from reliable sources, many of the companies are making $25 to $50 per day, per man. Provisions command $1 per pound for every variety. The Cariboo mines are in a more prosperous condition than for years. William creek continues to yield largely. Several companies have taken out an average of one hundred ounces each per week, throughout the season. The attention of the mining community appears to be centered on Lightning Creek, on which new developments are being continually made. The 'Lightning Company' has yielded regularly throughout the summer from 200 to 500 ounces per week."

MARKET REVIEW.

The Coal Trade.

NEW YORK, Dec. 30, 1870.

WHOLESALE.—Affairs remain pretty much in the same state as last reported. There is a fair demand for all sizes of coal by the near-by trade. Lots are, however, generally sold, ½ Broken, Egg or Nut, to ⅔ Stove. Buyers are not so particular in regard to the name or grade of the coal as they were a month ago, and take what they can get, if of good appearance. Prices were for Broken and Egg, $6; Stove, $6 50. These are the same quotations as made last week. Prices are good only for the day, or until accepted by the company or firm. The "Bay Bridge" has been got in running order, and coal was passed yesterday for the first. Freights from Amboy are 50c., from Port Johnston and Weehawken 45c. Eastern freights are unchanged, as no shipments are being made. There is no demand for coal from the East, and the cause must be either that they have a full supply on hand, or are afraid to buy at present rates. We think that coal will be $1 per ton higher sixty days from now, which is the shortest time for the present strike to end. Dealers should take a note of this and "govern themselves accordingly." The general "strike," throughout the coal regions is announced for January 10th. We don't think it will be of less than two months' duration. During that time coal may go to fabulous prices. The men have made money enough during the past six months to stand the "strike" comfortably, and "what is the use of working twelve months in the year when one can make as much money in nine?" is their old maxim. Our exchanges from the various coal regions denote quiet and order throughout, but a determination of the miners to protect their interests. We don't see why these men have not the same right to manage their business on a profitable basis as well as any one.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Dec. 24, 1870, compared with week ending Dec. 25, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila & Reading R.R.†	....	3,393,324	....	2,984,283
Schuylkill Canal	....	615,764	....	532,466
Lehigh Valley R. R.	....	2,015,296	....	2,210,020
Lehigh & Sus. R. R.	....	911,510	28,319	1,190,755
Lehigh Canal	26,576	604,2.8	....	789,079
Scranton North	....	412,804	....	6-4,283
" South	....	9-6,3 4	....	1,073,601
Penn. Coal Co., rail	17 811	933,716	218	1,069,295
" " " canal	....	14,706	....	16,602
Del. & Hud. Canal Co.	....	1,206 2 0	....	1,222,675
" " R. R.	7,912	179,4 8	11,192	520,000
" " south	1,060	122,687	4,433	423,555
By Jefferson R. R.	....	....	....	14,477
Shamokin	....	469,393	13,148	481,256
Trevorton	....	36,808	58	36,8 8
Lykens Valley Coal Co.	155	78 965	....	156,360
Wyoming South	....	384 706	....	3.6,645
Wyoming North	....	76,308	....	19,465
P. N. Y. C. & R. R. Co.	....	....	....	276,151
Williamstown, Col'y	809	200,349	3,955	293,796
Short Mountain	....	104 661	....	....
Total	54,323	12,811,281	58,352	15,474,552
1869	....	....	54,323	12,811,281
Increase week and year			4,029	2,663,271

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Dec. 24, 1870, compared with week ending Dec. 25, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	....	....	20,507	1,045,462
C. & O. Canal	....	....	....	596,692
H. & B. T. R. R.	4.660	353,707	6,223	308,169
Harrisburg & D.	....	....	....	576,560
L. V. R. R.	....	21,237	....	13 847
P. & N.Y. C. & R. Co.	....	....	....	239.660

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, December 24, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	755 04
" Port Clinton	— —
Total for week	755 04
Previously this year	35,470 17
Total	35,470 13
To same time last year	33,465 11

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, December 24, 1870 | 3,955 00
Same time last year | 809 17
Increase, Tons | 3.145 03
Total amount shipped to date | 293,796 11
Same time last year | 200,349 13
Increase, Tons | 93.446 18

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, December 24, 1870.

	WEEK.	SEASON.
North	451 01	1,931,489 18
South	4,433 02	423,555 13
Total	4,884 09	2,355,045 11
CORRESPONDING TIME IN 1869:		
North	30,934 00	1,398,793 17
South	1,059 08	120,970 04
Total	32,013 08	1,517,764 01
Decrease North	30,532 13	Inc. 534 636 01
Increase South	3,372 14	Inc. 302,585 09
Total Decrease	27,128 19	Inc. 837,241 10

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending December 24, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal		1,292 675 00
By Railroad	11.192 00	520,000 00
South	4,433 00	423,555 00
Total	15,625 00	2,236,230 00
By Jefferson R.R.	— —	1s,477 00
Corresponding time in 1869.	— —	2,250,707 00
By Del and Hud. Canal	— —	1,.06,280 00
By Railroad	7,912 00	179 458 00
South	1,060 00	124,687 00
Total	8,972 00	1,508,425 00
Increase	742,282 00	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Dec. 24, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	218 06	1,069 295 16	17,118 01	913,716 13
" Canal	— —	16,602 18	— —	18,706 18
Total	218 06	1,085,898 14	17,118 01	952,423 11

Increase, 1870, 150,374 18 tons.

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, December 3, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North		664,283 17
Shipped South		1,673,601 00
Total		2,337,884 17
For the corresponding time last year,		
Shipped North		412 804 11
Shipped South		986,324 15
Total		1,399,129 15
Increase		938,751 06
Decrease		

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via. the Pennsylvania and New York Canal and Railroad Company, for week ending Dec. 17, 1870:

	WEEK.	PREVIOUSLY.	INCREASE.	TOTAL.
Anthracite	4,170 00	3 496 00	674 00	10 850 01
Bituminous	5,674 18	2.8 2 02	2 822 16	13,344 19
Total	6,091 18	6,348 02	3,496 15	24,244 19

The tonage over the Road for week ending 24th, was as follows;

	WEEK.	PREVIOUSLY.	INCREASE.	TOTAL.
Anthracite	4,353 08	3,554 03	799 05	17,718 07
Bituminous	3,572 00	3,177 00	395 07	14,452 00
Total	7,925 08	6,731 03	1,194 05	32,170 07

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending December 24, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons cwt.	WEEK, 1869. tons cwt.	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	15580 06	2.029 09	1231276 12	830379 10
Upper Lehigh Region	3738 04		154050 10	77356 08
Mahanoy Region			3949 03	2705 07
Hazleton Region	359 05	61 04	319031 19	122944 02
Beaver Meadow Region			146331 12	97646 08
Mauch Chunk Region	10476 05	6106 16	258619 18	44.237 02
Totals	30104 00	27197 09	2112419 13	1574318 17
Increase	2536 11		538090 16	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	28348 09	26576 09	1090755 07	911510 07
Forwarded East of Mch Chunk by Canal			783079 00	604218 13
Delivered at and above Mauch Chunk	1755 13	377 19	48309 09	34287 12
Delivered to L. & B. R. R. at Plymouth Bridge		243 01	184266 17	19151 02
L. V. R. R. at Sugar N.				5151 03
Totals	30104 00	27197 09	2112409 13	1574318 17
Of the above there was transported on acc'nt of L. C. & N. Co.	12785 11	7653 11	314497 04	475671 00
W.-B. C. & I. Co.	11446 08	10192 10	632703 16	411556 07
Totals	24231 19	17846 01	947201 00	887227 07
Increase	6385 18		59973 13	
Decrease				

Shipments of Cumberland Coal

for the week ending Saturday, December 24, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	....	.....	....
Borden	534 03	.....	534 03
Consolidation	434 05	.....	434 05
Spruce Hill	425 15	.....	425 15
Midlothian	582 06	.....	582 06
H. and Baltimore	124 01	.....	124 01
do Va M	1,392 15	.....	1,392 15
V C & I Co	974 10	.....	974 10
G. C. C. and I	1,068 02	.....	1,068 02
Maryland	2,102 11	.....	2,102 11
American	1,845 10	.....	1,845 10
Atlantic	1,564 10	.....	1,564 10
Piedmont	1 837 05	.....	1,837 05
Swanton	1,197 10	.....	1,197 10
Barton	744 00	.....	744 00
Potomac	1,534 15	.....	1,534 15
George's Creek M. C.	424 14	.....	424 14
Franklin	1,590 06	.....	1,590 06
Big Vein	2,130 10	.....	2,130 10
Total week	20,507 08	.....	20,507 08
Previous	1024,95507	596,69214	1,621,648 01
Total year	1,045,46215	596,69214	1,642,155 09

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, Dec. 24, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870			17,616 06		17,616 06	
1869			12,000 00		12,000 00	
Increase			5,616,06		5,616 06	
Decrease						

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	520,196 16	882,297 18	1,402,494 14
1869	573.243 17	985,273 11	1,558,517 08
Increase			
Decrease	53,047 01	102,975 13	156,022 14

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, January 3. R. A.	W. A.	AT PHILADELPHIA, January 2. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 50 to 6 00	5 00 to 5 25	— —	4 50 to 4 75
Stove	5 50 to 6 00	5 25 5 50	— —	4 50 to 4 75
Chestnut	4 00 to 4 50	4 00 4 25	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 6 00		— —	— —
New England	" — —		— —	— —
Locust Dale	W. A. 5 50		— —	— —
Honey Brook, Le'h	W. A. 6 00 to 6 50		— —	— —
Spring Mountain	" " 6 00 to 6 50		— —	— —
Sugar Creek	" " 6 00 to 6 50		— —	— —
Sugar Loaf	" " 6 00 to 6 50		— —	— —
Old Comp'y's.	" " 6 00 to 6 50		— —	— —
Cross Creek	" " 6 00 to 6 50		— —	— —
Room Run	" "		— —	— —
Girardville	" "		— —	4 75
McMichael	" "		— —	4 75
Shamokin	" "	5 50	5 25	— —
Lykens Valley	" "	— —	5 75	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "	— —	4 75	— —
Henry Clay	" "	— —	5 00	— —
Powelton	" "	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

January, 1871.

	L.	Str.	Gra.	Eg.	Sto.	Ches
Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at Weehawken	— —	— —	— —	— —	— —	— —
Lackawana at do	— —	— —	— —	— —	— —	— —
Wilk'b're at Hoboken	— —	— —	— —	— —	— —	— —
Old Co. Lehigh at Pt. Johnston	— —	— —	— —	— —	— —	— —
Lehigh at E. Port	— —	— —	— —	— —	— —	— —

For freights to different points, see "Freights."

Prices for Coal at Mauch Chunk.

January 1871.

	F.L.	Bro.	Gra.	Eg.	Sto.	Chest.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila.	$5 00
Lemon " " "	4 75
Cumberland Vein Coal	4 75
Consolidation Coal Co.'s on board N. Y.	7 00
Maryland Coal Co. "	7 00

Prices at Baltimore—January, 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@— —
Pittston and Plymouth, do	5 65@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs.	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

January, 1871.

George's Creek and Cumberland f. o. b. for shipping...$4 40

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Treverton and Zerba Valley	— —@6 00

Prices of Gas Coals.

January, 1871.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y. Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 75 @8 00
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Despard Coal Co	$7 50 @— —
Penn	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gs Caoal	8 00 @— —

AT PHILADELPHIA.

Powelton	$7 80

Prices of Foreign Coals.

January, 1871.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House "	— —@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs. delivered

Freights.—January, 1871.

TO EASTERN PORTS.	From Philada's.	From E. Port and Port Johnston.	From Newburg.	From Rondout.
Amesbury	$2 50	$2 00	$	$
Bangor	2 30	1 60	1 60	
Bath	2 30	1 75	— —	
Boston	2 .0	1 85	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 00	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 35	2 00		
Fall River	2 00	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 4	60		
Middletown	2 25	1 25		
Mystic		1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00	1 10	1 20
New London	1 76	1 25	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		1 85
Providence	2 00	1 25	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20	1 30	
Salem	2 35	1 65	2 25	2
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	1 75		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	- 60	
Catskill		— —	— 50	
Cocksackie		— —	— 50	
Coeyman's		— —	— 75	
Cold Spring		— —	— 35	
Fishkill		— —	— 30	
Haverstraw		50	- 60	
Hudson		— —	— 50	
New York		— —	— 70	
Nyack		60	- 60	
Poughkeepsie		— —	— 35	
Rhinebeck		— —	— 30	
Rondout		— —	— —	
Saugerties		— —	— 40	
Sing Sing		— —	— 75	
Stuyvesant		— —	— 55	
Tarrytown		80	- 75	
Troy		90	- 75	
West Point		— —	— 35	
Yonkers		40	- 60	

Foreign and Provincial Freights.

January, 1871.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-3 tons | £14 00@£16 00
Liverpool, 5 per cent primage | 13s @16. ton

TO NEW YORK.

Provincial

Sidney	$3 00
Lingan	3 00
Cow Bay	— —
Port Caledonia	3 25
Little Glace Bay	3 00

TO BOSTON.

Sydney	$2 70
Lingan	2 70
Cow Bay	— —
Port Caledonia	3 00
Little Glace Bay	2 75

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 76
C. R. R., N. J., Easton to Elizabethport	1 08
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 16

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 76
C. R. R., of N. J., Easton to Pt. Johnson	1 11
Shipping expenses	25
Warfage	10
Total	$2 23

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 76
Morris & Essex R. R. Easton to Hoboken	1 11
Shipping expenses	25
Warfage	10
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	76
R. & D. R. R.	1 02
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 00

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	76
C. RR. of N. J. Easton to Elizabethport	1 08
Shipping expenses	25
Wharfage	10
Total	$2 19

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 15
" Port Carbon	1 18
" Port Clinton	1 08

TO NEW YORK.

From Schuylkill Haven	$1 75

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris "	2 10
Freight	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 05
Freight	
	2 45
For re-shipment	2 19

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1 05
Total	$ 2,10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	60 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.

	Per Ton.
To Manhattanville	8 cents.
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	12 "
Dobbs' Ferry	12 "
Nyack	12 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	23 "
Rondout	23 "
Boats of 100 Tons	Per Boat
To Manhattanville, and Return	$11 00
Spuyten Duvvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

METALS.

NEW YORK, December 29, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, $ ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	34 00@36 00
Pig, American, No. 1	— —@31 00
Pig, American, No. 2	— —@30 00
Pig, American, Forge	25 00@27 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@110 00
Bar, Refined " "	75 00@ 80 00
Bar, Common " "	70 00@ 72 50
Scroll " "	97 50@125 —
Ovals and half-round " "	97 50@125 —
Band " "	92 50@ 95 00
Horse Shoe " "	95 — —@ — —
Rods, ¾ to 3-16inch " "	82 50@ — —
Hoop " "	102 50@140 00
Nail rod, less 5 ₱ ct.	6¾@— —
Sheet, Russia, as to Nos. (gold)	10½@—11
Sheet, Single, D. and T. Common	—4¾@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₱ ton	56 00 @58 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ ₱ or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ ; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 16 @— 17
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	19 @— 20
Copper, Chili Pig	— @— —
Copper, American Ingot	22½@— 22½
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1¼ cents ₱ lb; Pipe and Sheet, 2½ cents ₱ lb.

Galena, ₱ 100 lbs.	$—	@—
Spanish (gold)	6 25	@6 30
German, do.	6 30	@6 30
English, do.	6 50	@6 50
Bar (net)	7 25	@7 50
Pipe (net)	7 25	@7 50
Sheet	7 75	@8 00

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	37½@—
Straits	33 @—
English	32½@32¾

PLATES.	Fair to Good Brands. Gold.	Currency.
I. C. Charcoal, ₱ box	$8 25 @8 50	$9 25 @ 9 75
I. C. Coke	7 00 @7 50	8 00 @ 8 75
Coke Terne	5 75 @6 75	7 00 @ 7 25
Charcoal Terne	7 25 @8 00	8 50 @ 9 25

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb

	Gold.
Plates, Foreign ₱ 100 lbs.	$ 37½@ 6 12½
Plates, Domestic ₱ lb.	8½@— 11½

REMARKS.

PETROLEUM.—The market for both Crude and Refined has been very dull, but prices remain unchanged; we quote Crude in bulk, 13 @ 14c. for January delivery; there is no spot Oil here, and in shipping order, nominally 17½c.; on the Upper Creek, 5,000 bbls. sold at $3 27½c. cash. Refined is steady at 23c.; the only sale we hear of is 500 bbls (settlement of contract), at 22½c.; and 15,000 cases for export to the Adriatic, on private terms. Naptha is dull and nominal at 9½c. In Philadelphia, the market has also been dull, and we only hear of 2,000 bbls., sold at 22½c., December delivery.

COPPER.—The manufacture of Copper and Yellow Metal are steady at our quotations. Ingot remains quiet, but the stock is held firmly; we have only to notice sales of 50,000 lb. Lake at 22¦ @ 22¼c., mostly at the latter price.

IRON.—The market for Scotch Pig remains very quiet. The receipts have been quite liberal. The importers continue to put their supplies in store, and quotations are nominally as before noted. There has been a little more inquiry for American, but nothing of moment has transpired; we quote nominally, $31 for No. 1, $30 for No. 2, and $25 @ $27 for Forge. Wrought Scrap has been in active request, and we notice sales of 1,000 tons on private terms. There has been an improved demand for new English Rails, and full prices prevail; 15 @ 20,000 tons, supposed 60 lb., sold for season shipment on long credit, but the price was not made public. American are quite but steady at the quotations noted in our last. Refined from Store is without change or improvement in the situation.

LEAD.—Pig remains quite dull, and we hear of no sales; $6 25, gold, is the nominal price for ordinary Foreign Bar; Pipe and Sheet are steady at old rates.

TIN.—There has been very little business in Pig, and we have only to note the sale of 100 slabs of Straits at 33c., gold, and 5 tons English at a private price; we quote Straits 32½ @ 33c., English 32½ @ 32¾c., and Banca 37½ @ 38c., all gold. Plates have been very quiet, but prices are steady at our quoted rates.

STEEL—Is selling in a small way from store within our range.

SPELTER.—The demand for Foreign is light, but the stock is held very firmly; 15 tons Silesian sold at $6 12½c., gold.

ZINC.—Sheet is very dull, and prices are nominally steady. Am. Ox. Zinc. 6½ @ 7c.; French, 10 @ 11c.; Sheet, 8½ @ 9c.; Manganese, 4½ @ 5c.

Mining Stocks.

NEW YORK, December 28, 1870.

Operations in the Mining Stock Board are nominal. We have not received any report of the transactions of the Board for the past week, from the fact that their business does not warrant their issuing any.

San Francisco Stock Market.

We have reports from the San Francisco Stock Market, dated Dec. 22. There is not much change to note in the price of stocks, compared with our quotations of last week. Below is our report:

Yellow Jacket	39¾
Kentuck	32
Chollar Potosi	72¼
Gould & Curry	68
Belcher	6½
Imperial	11
Amacor	280
Crown Point	—
Savage	—
Hale & Norcross	.66

The Slate Trade.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	..	$6 50@	7 00
" green, 1st " "	..	6 50@	7 00
" red, 1st " "	..	15 00@	16 00
" variegated, "	..	5 75@	6 20
Pa. b'k and d'k blue, 1st qual., "	..	6 00@	7 05

VERMONT SLATE TRADE.

Hydeville, Vt.

REPORT OF SLATE SHIPPED FROM HYDEVILLE, VT., VIA R. & S. RR., FOR THE WEEK ENDING DECEMBER 24, AND FOR THE YEAR 1870.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co. sqs.	—	6 80	6080
Western Vermont Slate Co	—	80	80
Blue Slate Co	—	1662	1662
The Evergreen Slate Co.	60	5160	5220
Forest Mining Slate Co.	—	215	215
West Castleton Slate Co.	—	120	120
E. D. Billings	—	279	279
R. M. Copeland	60	263	263
W. E. Williams	—	209	200
Forest Slate Co	—	80	80
Total	120	14079	14079

MILL STOCK.

Eagle Slate Co.	— boxes.
E. A. Billings	— boxes.

FINISHED MANTELS.

West Castleton Slate Co. box.	57	281	338
Forest Mining "	35	237	272
Total	92	518	610

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co. box.	..	1414	1414
West Castleton Slate Co.	..	661	661
Western Vermont	—	80	80
E. A. Billings	1	144	145
Total	1	2299	2300

TILE.

Eagle Slate Co. bxs.	..	..	..
Western Vermont Slate Co.	....	....	

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending December 24, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co.	....	6,756	6,756
New York Slate Co.	....	3,170	3,170
Middle Granville Slate Co.	....	732	732
American Slate Co	....	....	....
Benj. Williams	34	1,443	1 477
Jones & Williams	....	179	179
Eagle Slate Co.	36	194	230
H. W. Hughes	....	235	235
J. D. Jones	....	35	35
Total	70	12,744	12,814

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co.	24	2,478	2,502
Penrhyn Slate Co.	....	....	.....

MILL STOCK.

NO. OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co. cars	—	32	32
Penrhyn Slate Co "	—	—	—

Preparations of Tannic Acid.

O. ROTHE recommends the following process as the best and simplest:—Eight parts of pulverised nut-galls (the Chinese galls are preferred by the author) are macerated for two days in a mixture of twelve parts of ether and three of highly rectified alcohol, care being taken frequently to move the vessel containing the mixture. The liquid having been poured off from the residue, the same quantity of ether and alcohol is poured on the powder, and, after a short maceration, the pulpy mass is pressed; the mixed liquids are left at rest for some twenty-four hours, after which there are added to the fluid twelve parts of water; this having been done, the mixed alcohol and ether are removed by distillation, the greenish resinous matter which will be found floating on the residual liquid is removed by filtration, and after that the liquid is evaporated to dryness by means of steam and the residue ground to powder.

Testing Carbonate of Lead for its Goodness as an Ingredient of the Manufacture of Crystal Glass.

SINCE the presence of iron and copper are the only impurities which interfere with the use of white lead for the purpose above named, Dr. A. NEUJEAN tests for the presence of these substances colorimetrically in the following manner:—From 20 to 40 grms. of the substance (white lead), if apparently very pure, and only 10 grms. if obviously impure, are dissolved in dilute sulphuric acid, and next precipitated by means of sulphuric acid; the liquid having been filtered is evaporated and reduced to a small bulk, and next, by the addition of water, made up to a constant volume, after which a few drops of sulpho-cyanide of potassium are added; the presence of copper is tested for by a similar operation, ammonia being applied instead of the salt just alluded to.

Cleaning Oil Painted Surfaces.

TAKE a piece of soft flannel, put it in warm water, and squeeze it till it feels dry; next dip it gently on to some very finely pulverised French chalk, and rub the painted surface with the flannel; the effect will be the removal of all dust, greasy matter, and dirt; the surface is next washed with a clean sponge and water, and dried with a piece of wash-leather. This method does not injure the paint like soap, and produces a very good result.

Method for Repairing Porcelain Evaporating Basins when Cracked.

DR. WALTL recommends, first to dry the vessels thoroughly in a drying-stove, and next to fill them with a rather concentrated solution of silicate of soda and leave the solution in the vessel for about twenty-four hours after the liquid has been poured out. The vessel is gradually dried at a gentle but increasing heat, and it will then be found to hold liquids again and be fit for further use.

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Ship Raising.

A paper read by Col. GOWAN before the Polytechnic Club of the American Institute.

[Conclusion.]

WHY, gentlemen, I am very sure, (and I know of what I speak) that I could lift and bear the "Great Eastern," the largest steamer afloat, over the bar at Sandy Hook and carry her out again, without straining a single plate or screw during the process; and no better test than that can be imagined or will be likely to occur. One of the vessels which I raised in Sevastopol harbor weighed upwards of 5000 tons, and in addition was filled with mud and *debris;* and to do this I was obliged to resort to no greater precautions than I had taken with the others.

My plan, both by its ease and economy, would seem to be the most natural, as well as the most effective and thorough in the work done and manner of performance. It is this simple system which I wish to introduce into general use. I have submitted my plans to eminent engineers in London, New York and New Orleans, and they all agree that it is the most practical and feasible method by which ships may be enabled to pass a bar. I purpose constructing docks of a description somewhat analogous to those which I used at Sevastapol, but with the addition of a heavy trussed cradle for the vessel to rest upon. In conversation with the President of one of the largest lines of steamers which ply across the Atlantic, he remarked that it was soon their design to commence running a new line to St. Thomas and Aspinwall, "and," said he, "Colonel GOWAN, if you will apply your system to the bar of Galveston, we will also run them there." The Chamber of Commerce at New Orleans, to which I submitted my plan early in April of this year, also reported in the most favorable and encouraging terms in behalf of the introduction of my system for lightering vessels over the bars at the choked-up mouths of the Mississippi, and the following resolutions were unanimously passed by the Chamber, after I had described to them at some length my mode of operation:

"*Resolved*, That the report of the Committee on Obstructions be adopted, and that the system of Colonel JOHN E. GOWAN for opening the mouths of the Mississippi to the largest class of vessels, is recommended to the favorable consideration of the State and National Governments.

"*Resolved*, That the thanks of the Chamber of Commerce be tendered to Colonel GOWAN for his able and interesting lecture; also, that the report of the Committee on Obstructions be published, and that a copy of the same be forwarded to each of our Senators and Representatives in Congress, as well as to all Senators and Representatives, also Governors of States bordering upon the Mississippi river.

(Signed) "GEORGE A. FOSDICK,
"Chairman of Chamber of Commerce."

The New Orleans *Picayune* also published an ample article upon the same subject, from which I quote the following paragraphs:

"A score of plans for obtaining this most desirable end has been proposed, and the most ingenious theories have been published on the subject, each of them claimed by its inventor or advocate to be the best, and the only one calculated to secure a remedy. We have had propositions to dredge the bars by means of machinery peculiarly constructed for that particular purpose; others, to confine the current, by a system of jetties, to a narrow limit, so that its increased strength would sweep away before it the deposit of earthy matters held in suspension by the water, and precipitated to the bottom at the point where the water meets the inflowing tide from the sea. The dredging system, even were it capable of making a channel of sufficient depth of water to secure the passage of vessels of large enough tonnage to make their employment in voyages to this port profitable to their owners, has against it the serious objection that the depth of water secured by it is not permanent, but demands unceasing labor and application of the means employed, as the alluvial deposits are continually renewed, and must therefore be continually removed; and it is extremely costly.

"We incline strongly to the conviction that what is so much desired can be accomplished by the adoption of a system of floating heavy draft vessels over the bars, and that the invention of Colonel JOHN E. GOWAN is better calculated to do that work than any other yet brought to notice. This gentleman has devoted more than twenty years to the business of raising sunken vessels, and has met with remarkable success in it.

"We will not attempt more than a very brief description of his process, which consists of a number of caissons, divided into water-tight compartments, which may be filled or emptied as occasion requires, and are furnished with ample steam-power for the filling or exhaustion of the compartments, and for locomotion, as well as for working of the machinery for raising the vessel to be carried over the bar to a proper height.

"The principle is in some respects not unlike that of the dry-dock, the caissons being first brought into proper position with regard to the vessel, which is to be raised enough to carry her over the obstruction, and then filled with water, so as to sink them to the required level, after which a strong girder is passed beneath the vessel, to which are attached chains of great strength, by means of which and the simultaneous pumping out of the water from the caissons, sufficient buoyancy is obtained to float the vessel over the obstruction. The process, it will be seen, is quite simple. That it is no mere theoretical proposition is fully demonstrated by its successful application by the inventor in raising the sunken Russian war vessels in the harbor of Sevastopol. One of those vessels weighed five thousand tons, and was filled with mud. A committee of the LLOYD'S Salvage Association, consisting of distinguished officers of the British navy, after careful examination, approved of it, and Sir CHARLES A. HARTLEY, Chief Engineer of the Commission for regulating the mouths of the Danube, bears testimony to its value and merit.

"We are informed, also, that Gen. BEAUREGARD, who, besides his admitted competency as an engineer, has paid great attention to the question of the bars at the mouth of the river, speaks of Col. GOWAN'S plan in the most favorable terms.

"The inventor declares that by using his process he could bring the Great Eastern over the bar and carry her out again. We trust that our business men will take this matter promptly in hand, with a view to secure its manifest advantages in aid of our commerce."

The objection may be raised, that if dredging and channeling were to be entirely suspended, accumulations might continue to increase until the inlet to harbors would be altogether stopped up. But a moment's reflection will show that this could never be, on account of the constant working of natural laws. The river must find an outlet large enough to permit it to empty itself into the sea. Spring freshets with augmented force would contribute to sweep away a portion of the winter's debris, and the ebb and flow of the tides must exert a continuous influence unfavorable to the complete closing up of a channel. Indeed, experience proves that sand-bars remain of nearly the same proportions during long consecutive periods; and if by any remarkable combination of circumstances the mouth of a river should become entirely blocked up, the stream would soon furrow for itself a new and sufficient passage with increased and irresistible impulse. During the late exhaustive war in this country all dredging operations at the mouth of the Mississippi were suspended *in toto*, and for the period of four or five years the income in the deposit at the bars was quite imperceptible or infinitesimal. On the contrary, if the natural accretion is disturbed, but a correspondingly short interval elapses before the mighty influences of tide and wind and element combine to bring back the lost debris and restore it to its former place. What is wanted, therefore, is a principle such as that I speak of, which acts and does its work with independence and uniform regularity.

When in May, 1868, I laid my plan before the Lloyds' Salvage Association at London, it was referred to a committee of its officers, consisting of Post-Captains Russell, Curme, Hurne and Bonham, of the Royal Navy, who reviewed it and reported most favorably, and their endorsement was virtually that of the British Admiralty.

A little earlier, Sir Charles A. Hartley, Engineer-in-Chief of the Danubian Commission, for regulating the mouths of the Danube, which was created by the Treaty of Paris at the close of the Crimean War in 1856, wrote me a note, which I beg leave to read:

"LONDON, January 16, 1868.

"DEAR SIR—I have examined the drawing you have exhibited for raising sunken ships, and the system appears to me to be a very simple and practical method for accomplishing that object. I assume that the caissons you propose constructing are of the same description as those you used so successfully in raising the men-of-war sunk in the harbor of Sevastopol during the Crimean War.

"Your well-known success in raising the Russian Fleet, together with my own views regarding the practicability of your invention, enables me to bear a willing testimony to its value and merit. "I am, dear Sir,

"Yours very truly,
"CHARLES A. HARTLEY.

"Col. GOWAN."

Here, just in passing, let me direct your attention to a consideration of the immense foreign traffic in breadstuffs which could, and doubtless will be, carried on when our harbors are thrown open to large draught vessels.

With Europe disturbed, as at this time, by exhaustive wars, and the producing classes of the people under arms and unable to till the soil, America might become, with every degree of probability, the grain mart of the countries of the Continent. This, gentlemen, is a matter of great importance. It cost the price of two bushels of corn in freight to bring one bushel of corn from the West by rail to the city of New York; that is, *two bushels in every three are consumed in transportation;* whereas, if floated down the Mississippi, and thence across the ocean, to which there is no natural impediment except the shoal water at the mouths of that vast estuary, breadstuffs could be sold in France and England as cheaply as, and of a better quality than, those imported into those countries from other sources. The chief supply of breadstuffs for the European market is now derived from the broad fields of Russia. $100,000,000 worth of grain from that empire is annually consumed in Great Britain and France alone. What a magnificent market is that for the employment of American enterprise and industry! With the port of New Orleans accessible to first-class vessels, say of five or six thousand tons burden, the native products of our Western States would be shipped abroad at a figure defying the competition of the world, and an impulse given to the agricultural interests of this country which would make us the grain-growers, *par excellence*, of all Christendom.

I have spoken more particularly of New Orleans in connection with the exportation of Western breadstuffs to Europe for the sole reason that the great natural artery of our continent, the Mississippi, passes out at that port of shipment, and thus offers the easiest and cheapest route to the Atlantic. But the discouraging fact stares us in the face that ships of sufficient burden to bear our breadstuffs to a ready market, at low prices, cannot get over the sand-bars which block up the port. It costs less to employ vessels measuring five or six thousand tons in a carrying trade across the ocean than it does to make shipments in vessels of six or seven hundred tons. Any shipping merchant will answer for the accuracy of this statement. And again, the distance between New Orleans and Great Britain is no greater than between Southern Russia and Great Britain.

During a conversation I recently had with the able and far-sighted President of the Central Illinois Railroad, said he, "If the harbor at New Orleans can be opened up I see no reason why the grand granary of the West should not empty itself, in an unbroken flow, into the lap of Europe. We have the corn, we have the great canal, but we cannot freight the ships at New Orleans, but have to send by rail to open ports, where corn can be shipped at the wharf."

Hitherto, gentlemen, our crops of corn, wheat and rye have rotted in the ground, because the supply exceeded the demand in this country; and it is only in times of destructive and engrossing wars in Europe, of drought or famine, that we have succeeded in sending our products there at remunerative rates. We have not been able to compete with far-off Russia in this trade. But sweep away the bars which hedge in our bays and our harbors and the great grain fields of the Western States will be as accessible to Great Britain and France and Germany as are those broad acres rich with waving spears, less harmful than the spears of Dons and Cossacks, which lie beyond the frozen seas of the Muscovite dominion.

The importance of this matter I need not further urge upon you. A great evil exists, a great want is felt, a wide field is spread out before you by the hand of Providence, teeming with opportunities. Our ports are virtually blockaded by natural difficulties, which will never be cured and may hardly be alleviated, by the most expert engineering skill and knowledge than can be brought to bear. National industry and enterprise will be newly awakened if an expedient can be found which will afford a remedy, cardinal and adequate. It is no presumption in me to claim that the solution of this serious problem is embraced in the system I have made known to you, a system simple as it is sound, and well tried and tested, and proven to be founded upon the rock of correct principle. The truth is before you, and, I doubt not, the conclusion which you will arrive at will be fully in confirmation of my own, that ship-raising and carrying across harbor obstructions will become one of the future and fixed facts of this great century of discoveries, improvements and scientific advancement.

South African Diamonds.

THE diamond diecoveries have been very large during the past fortnight, and the value of the diamonds shipped from colonial ports conveys better, perhaps, than the details of the discoveries how valuable the gems have been. By the Norseman, which leaves for home to-day, was shipped from Algoa Bay diamonds valued at £11,000, and she has on board besides three boxes of diamonds, the value of which is not stated. And further than this, we are told that there is a consignment of diamonds, valued at £20,000, already at Port Elizabeth, and will be sent home, per Northam, by Messrs. MOSENTHAL & Co. The finds during the fortnight, as we learn from the diggings, have been, at the Vaal, a diamond of 80 carats, of superior quality, by a Dutchman; one of 7¾ carats, and one of 20 odd carats, by a man named MILLER, a Bloemfontein wagonmaker. On the 8th of September, at the Jaggerstontein diggings, eight diamonds were disinterred, one weighing 22¾ carats, a perfect gem of octahedronal shape, valued at £1,500. Two days after this ten more diamonds were found at the same place, making in all twenty-two diamonds for the three days. During the week no less than fifty-three were exhumed at Jaggersfontein, and there were only thirty diggers at work at the place. Mr. W. BURGHOE, of Graaff-Reinet, found a diamond valued at £3,000 on the Vaal river, and reports that an 80-carat diamond and one of 26 carats had lately been found on the Pniel side. A brother of Mr. W. WEBB has also picked up a diamond said to be of the value of £200, and a gentleman writes from the diggings to a friend under date September 12, 1870, that on that day a diamond was picked up by a Natal company weighing 83 carats, and valued at £20,000, and a Mr. SHINE, of Natal, had that morning picked up a diamond of 13½ carats. It is impossible to give anything like a correct list of the lucky diggers, but the above will convey what the finds have been like. We will give in conclusion one or two extracts from the letters of diggers to show the difference of feeling entertained by those who have worked at the fields.

One of Mr. GEORGE REED'S party writes to a relative in Port Elizabeth, under date Gong Gong Diggings, September 5: "I can tell you, lots of people will be sold if they think to make lots of money up here. There are some who will make money—perhaps one in a hundred—but who have to work very hard here. We have washed seventy-five cart loads of ground and have found nothing; but JACK SHEPPARD has found a small diamond, worth about £3. A very fine one was found alongside of us to-day, worth about £100. Yesterday an old woman went behind a bush, and while sitting discovered just beneath the surface a diamond worth about £720. We are about ten miles from the main camp. I think there are about 5,000 people—men, women and children included. I think all who have anything to do down below should stay where they are; but those who have nothing to do, and nothing to lose, this is the place for them, and they seem to be the lucky fellows. There are many people up here whom I know. I shall not stay longer than the 1st of December. NEWTON and myself intend to leave for home then. I hope we may have luck before that. It is very hot in the summer up here. They say you can cook meat on the stones with the sun. There is much drinking going on at the upper camp. Some fellows, when they find a diamond, do not work until they have drunk it out."

Two letters received from other Port Elizabeth diggers give rather gloomy accounts of the fields. One states that he had been working about two months and had got nothing; the other reports that he had met with no success, and that a good deal of sickness was prevalent at the fields.

A Queen's Town digger writes: "Most of the diggers look dispirited and unhappy, and in reply to my query, 'What luck have you had?' the answer was in nearly all cases the same—'We have scarcely paid expenses.' Of course there are exceptions, but they are very few. It is estimated that diamond-digging has hitherto paid only about five per cent. of those that engaged in it."

Mr. RICHARD IMPEY writes as follows, under date of Vaal river, August 26, 1870: "Nothing very particular to report, excepting that the find of diamonds has been unusually large. On the 2d a beautiful straw-colored diamond of 55 carats was found on the Pniel side by one DE KOCK. On the 24th one of 56 carats, straw-colored, was turned out by PARKEL, who left almost immediately with his prize for England. One of the 19½ carats, also straw color or light orange, was found by DIGGINS. Many others of 16, 12, 11, and all weights and shapes have been found during the past week; in fact, the find has been greater than in any other week previous. Parties still keep pouring in continually from all parts."—*Capetown Standard*, November 4.

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Our New Volume.

THE present issue of the ENGINEERING AND MINING JOURNAL inaugurates the eleventh volume. We may fairly claim to have established its position as a representative American journal, and we look back with some pardonable pride upon the struggles of more than five years, the memory of which, we must confess, is far more agreeable than were their pressing labors and anxieties.

Some indication of the historical and scientific values attached to the ten volumes of this publication is given by the fact that the complete set now sells, bound, for one hundred and eight dollars; and but few copies are to be had, even at that price. For public libraries and the collections of professional men, the series is necessary at any price. In no other form can the latest results of mining, metallurgical and engineering science be obtained. Text-books, as is well known, lag ten years or more behind the age; and the more thorough and elaborate they are made, the longer it is before publishers can afford to issue revised and perfect editions of them. It is in periodicals that the student must find the news, of science as of politics.

We trust that the satisfaction now expressed by our subscribers will be enhanced by their experience of us during the coming year. We certainly do not intend to allow our paper to fall below the standard it has thus far maintained. On the contrary, we are determined to increase its value and reputation. We are aware of many features that might be added, and some that might be improved. Our friends and patrons shall be informed of all deficiencies in the pleasantest possible manner by the improvements which we shall introduce.

The ENGINEERING AND MINING JOURNAL is not conducted in the interest of any section or clique, and it relies for support upon the whole of that public which is interested in the arts and industries it represents. To all intelligent miners, metallurgists, machinists and engineers we appeal. We take no particular pains, and we have no need to take pains, to retain our old subscribers. They have got acquainted with us, and they stand by us faithfully. The same is true of our advertising patronage. But to those who have not yet entered either of these classes, we extend our earnest invitation to try us; and we are willing to leave our merits, after trial, to their verdict.

Average Value of Ores.

THE Colorado *Herald* takes up our criticism upon Gov. McCook's boast of the "area" and "average value of ores" of the Colorado mines; and claims that, taking the average value of ores to mean the average yield of the ores actually treated, Colorado "can produce ores of a larger average value than any other country now known."

We do not care to dispute in general terms concerning a matter which can be settled by figures. Let the *Herald* say what is the average value of Colorado ores, and tell how it is ascertained. Then by applying the same method to some other locality we can have a basis of comparison.

But we repeat what we said before, that this will be the poorest of tests by which to measure the value of the mining industry. The yield of ores sent to mill, without reference to the quantity *not* sent to mill, indicates merely the grade of ore that can be profitably worked. "The expense of mining," says the *Herald*, "involves all the incidents of waste vein matter, whether of gangue, wall-rock, or 'too poor to work,' and is in no manner pertinent to the issue." To this we must demur. It is very pertinent indeed to the only issue which is important, namely, that of the value of the vein-material which has to be excavated in mining.

Taking the issue as the *Herald* now puts it, we must say that, in our opinion, Colorado ranks among the regions producing abundant ores of medium grade. This is far better than mere "richness." But we wait for the *Herald's* figures.

Mining Law in Utah.

A DECISION of Chief Justice MCKEAN, of Utah, rendered last September, embodies some points of considerable importance to the mining ihdustry of that Territory.

The mine involved was the Emma, in Little Cottonwood Cañon, which is said to be worth half a million dollars. Of course, the title is in dispute. This is seldom the case while mines are poor or uncertain, and almost always the case, thanks to the loose and reckless regulations of the mining districts, when, all other difficulties and perils being safely passed, the mines begin to be profitable. Dishonest speculators lie in wait for the mine-owner first; then come the incompetent managers, to complete his ruin; and what these two classes cannot succeed in bagging, the lawyers are sure to get, if they have a chance.

Pending an action at law for the possession of the mine, the plaintiff (who was not in possession) sought by a bill in equity to obtain an injunction to restrain the defendants from furtner working the mine. This injunction the Court refused to grant; and its grounds for the refusal, as set forth in the opinion of Jndge MCKEAN, are very seasonable.

It is declared, first, that the granting of an injunction is a matter wholly within the discretion of the Court, and that an injunction ought not to be granted except for the prevention of great and irreparable mischief, and that it cannot be demanded as a matter of right. On a motion for a preliminary injunction, the Court is not bound to decide difficult or doubtful questions of law, or disputed questions of fact.

Again, if the plaintiff permit the defendants to remain in possession of a mining claim several months without interference, working it as their own and expending large sums of money in developing it, a court of equity will require a very clear and strong showing to induce it to grant or sustain a preliminary injunction to stop the work.

Applying these and kindred principles, confirmed by abundant authority, to the case before him, the Chief Justice unhesitatingly denied the motion for an injunction. The essence of the matter was, that in the autumn of 1868, the plaintiff spent about one hundred dollars in opening a mine which some say was the Emma, and some say was not; that he abandoned the whole thing for two years, without even securing a title to the mine, which was then called the Susquehanna; that in August, 1870, he got hold of a title to the mine he commenced to open in 1868, from a man who bought the claim at a private sale of the effects of the original locator; and, finally, that he now attempts to prove the identity of the mine with the Emma, which the defendants have been working for two years without interruption.

We rejoice that the firm position taken by the Court will protect the parties in actual possession. The attempt to get the property away from them looks very like a piece of piracy, though it may be according to the "laws" of the mining district in which the Emma is situated. If the present owners lose it, it will be partly their own fault. They assisted in making local regulations which conferred an absolute title upon locators, and did not require the proper description of claims upon the record, so that they could be at any time identified. Now they have one of these ugly "absolute titles" held over their mine, and they must rely on oral evidence to show whether the mine is really theirs. It is as bad as the case of the market-woman, who was reduced to prove her own identity by saying, "I've a little dog at home, and *he* knows me!"

In our opinion, no mining district has a right to confer "absolute title" on any terms. The possessory title, dependent upon occupation and reasonable diligence in development, is the only one that seems to us consistent with the United States law, which declares mining on the public lands free to the people. The idea that, under such a license, a man can locate a claim, abandon it for two years, and die; and that some stranger can buy his "rights" after death, so as to claim the property from parties who have taken up the abandoned claim and developed it successfully, to the great benefit of the country—is positively ridiculous. Yet such is the fashionable mining law of our Territories.

In this Emma case, the present possessors are in peril of losing the mine of its identity with the formerly abandoned location can be proved. At all events, they are probably in for an expensive law-suit, which, if it had begun with an injunction, would have rutned them.

How long will it be before the incredible stupidity which frames our local mining regulations will see that safety and justice and prosperity demand proper provisions for these two great points: *Description of claims in the record*, and *Forfeiture of claims by failure to work them!*

The New Mining Locomotives.

THE Baldwin Locomotive Works have had on exhibition for the last three days two mining locomotives, ordered for the Wilkesbarre Coal and Iron Company's collieries in the third anthracite coal region. Mr. PARRISH wishes to find some substitute for the mule as a carrier in the mine. During a strike or other other suspension of work a large stud of mules is a great expense. A locomotive costs nothing when it is doing nothing, and if well cared for does not grow old. Another outlay is saved in the item of drivers. One man suffices to drive a locomotive, and a few couplers to handle an entire train. The fire-box is square and deep, and so little stoping is required, that the fire door need not be opened more than four or five times during the entire day. While the locomotive was standing on the track in the shop the steam-gauge indicated 120 pounds pressure in the boiler, and yet the engineer had laid a damper-plate over the chimney-hole. Had the chimney remained open the safety-valve would have deafened the shop. It seemed difficult to explain this excellent draft, but it was an evident fact. The machine was run across the floor at various speeds, started with ease, and stopped in the space of a foot or two. There was an appearance of perfect docility about it which relieved us from all suspicion of accidents underground. On examining the working gear, this little locomotive appeared to be as staunchly and well finished as any passenger engine, but was entirely without ornament. The wheels were necessarily small but heavy, with a broad, flat tread, and very light flange. The two cylinders, nine inches in diameter (inside) by twelve inches stroke, lie under the front end of the boiler. The piston rods play between groups of four square slide-rods, and a simply adjusted link motion works just forward of the fire-box. The connections are of course inside, on the cranked axle of one of the two pairs of drivers, (of thirty inches) which are the only wheels. The fire-box and low platform overhangs behind. As coal is always at hand, no coal space is needed, and the water-tank is folded over the top and sides of the boiler, acting as a jacket, and feeling quite hot to the hand. This tank holds 190 gallons, and the whole engine, with fuel and water, weighs nearly 15,000 pounds. The makers guarantee that it shall haul, under all circumstances, with wet and dirty rails, on a level, 340 gross tons; on a 60 foot gradient, 80 gross tons, and on a 100 foot gradient, 50 gross tons. Under favorable circumstances it will of course do more. The fire-box platform is covered with a light wagon-top roof, to guard the engineer's head. The extreme height is five feet four inches; extreme width, five feet one inch.

Several engines somewhat similar to these have been constructed in Pittsburg, and used in the mines of that neighborhood, giving satisfaction. These are somewhat simplified, but not to such an extent as to interfere with their being taken readily to pieces, examined or repaired. It is needless to say that they are made with conscientious care, and made strong, to bear rough usage at the hands of ignorant or thoughtless persons.

New Publications.

A SYSTEM OF INSTRUCTION IN QUANTITATIVE CHEMICAL ANALYSIS. By DR. REMIGIUS FRESENIUS, Professor of Chemistry and Natural Philosophy at Wiesbaden.

From the last English and German edition. Edited by SAMUEL W. JOHNSON, M. A., Professor of Analytical and Agricultural Chemistry in the Sheffield Scientific School, Yale College. New York: JOHN WILEY & SON, No. 2 Clinton Hall, Astor Place, 1870.

The different editions of this book have been for years almost universally used as a guide by students of chemistry, both in this country and in Europe. No better proof can possibly be given of the value of a work than that editions are rapidly sold off and new ones called for. This edition has been prepared with special reference to the wants of the American student. Some matter has been added and some omitted from the last English and German editions. We are informed that Professor JOHNSON has prepared a chapter on the old and new chemical nomenclature, with rules for converting the old formulæ, which have been retained in both the qualitative and quantitative volumes, into the new. This chapter will be ready in a few days, and will be furnished gratuitously to those who have this edition of FRESENIUS. The discovery of new and improved methods of analysis proceeds so rapidly that the appearance of a book giving the latest advances in chemical science is always a just cause for rejoicing.

Two Great Works.

ALMOST simultaneously we are informed of the successful sinking of the Brooklyn caisson of the East River bridge and of the completion of the Mount Cenis tunnel. Both these great engineering works have been described from time to time in our columns during their progress. We merely chronicle at present their assured success, as cheering evidence that the victorious achievements of peace do not pause, though continents are shaken with war.

It was only the other day that the public trembled at the story of a disastrous conflagration within the Brooklyn caisson. The real danger and damage appear to have been ridiculously over-estimated. In fact a story is going the rounds to the effect that Mr. ROEBLING concocted the catastrophe on purpose, in order to get the Fire Department to fill and sink the caisson for him *gratis*. At all events, we are glad it is safely down; and we look forward with confidence to the progress of matters on the New York side.

On the Fusibility of Platinum in the Blowpipe Flame.

By W. SKEY, Analyst to the Geological Survey of New Zealand.

THE metal platinum has hitherto been supposed to be infusible, except at a temperature that is so high as to be incapable of being produced by the common blowpipe; at least I have carefully searched for any statements to the contrary without success.

When I was lately engaged in studying the effects of the hot-blast blowpipe flame, the results of which investigation have already been communicated to the Wellington Philosophical Society, I found it necessary to test, with accuracy, the degree of fusibility of platinum; and discovered that if the loss of heat from the flame, by conduction, was guarded against, platinum can be fused with an ordinary blowpipe blast through a candle flame. The method adopted was to substitute, for the metallic

nozzle generally employed, a tube of clay or glass, either of which is a feeble conductor at best, as compared with metals.

By this means fine platinum points were fused in an unmistakable manner to beads. The blast was that ordinarily used in the laboratory by the use of the hydrostatic blowpipe, the flame being that of a stearine candle.

As it might be urged that, perhaps, the platinum I treated might contain an admixture of more fusible metal, and that its melting-point might thus be reduced, I prepared some of the platinum for special trial, which was absolutely free from such fusible metals.

As the fusing point of platinum has been ascertained to be 4593° F., we must, from the above experiment, conclude, that if proper precautions are taken to prevent loss of heat by conduction, this high temperature can be produced by the ordinary blowpipe operating upon flames of this description.—*Chemical News.*

Precious Metals and Precious Stones—No. I.

The first of two lectures on this subject, by Prof. JOHN MORRIS, F. G. S., of University College, was delivered at the London Institute, Finsbury circus, on Thursday evening, and embraced an account of the precious metals and their distribution. The interest in the lecture, which was listened to with marked attention throughout by a large audience, was much increased by the large number of rare and beautiful specimens with which it was illustrated, and which greatly facilitated the thorough explanation of the most minute details.

Among the numerous elementary substances known to the chemist some, from their peculiar properties, are classed as metals, and distinguished from the other bodies by their lustre, opacity, color, weight, and being conductors of heat and electricity. The metals are further separated from each other by their difference in weight, fusibility, ductility, malleability, by their affinity for oxygen, and the reaction with each other or with the other elementary bodies, some being allied to sulphur and others to phosphorus. among the non-metallic substances. Some are known as alkali metals, some as alkali earth metals, some as base and other as noble metals—this latter term being applied to gold, silver, mercury, platinum, palladium, iridium, osmium, ruthenium, etc., the term precious metals being generally applied to those which undergo the least change, and are the most valuable in the arts, and for the purposes of currency, as gold, silver and platinum. It is to these that I propose chiefly to direct your attention; as their antiquity, characters, distribution, associations, geological positions, and economical uses.

Gold, as is well known, is yellow by reflected light, and green by transmitted light, is very malleable and ductile, and capable of being drawn out into very thin wire, or beaten into leaves about 290,000ths of an inch in thickness. From usually occurring in a native state, and in alluvial deposits, it was readily found, and thus the knowledge of it dates from a remote antiquity; nearly 200 notices of it occur in the Bible under different uses, and about 80 in its connection with silver. This gold appears to have been chiefly obtained from Nubia and Ethiopia, and was worked from granite in the district which lies between the second cataract and the Red Sea. The Egyptian term for gold being Naub, or Nub, hence Nubia; and that for silver, Hat, or white gold. Gold, therefore, has always been an object of value, and eagerly sought for by all people, from its peculiar properties of ductility, malleability, and freedom from corrosion. Gold was early known also in this country, as the Romans appear to have found gold coins among the ancient Britons, and to have known of its existence at Gogofau, in Wales, where are the remains of the ancient working described by Mr. WARINGTON SMYTH, in the Memoirs of the Geological Survey. Gold occurs chiefly in the native state alloyed with more or less silver, and occasionally, but rarely, with tellurium, bismuth, mercury, palladium, and, more or less, intimately combined with iron and copper pyrites, some lead and antimonial ores; the state in which it exists in them is somewhat doubtful.

Geography.—Gold, like iron, is very widely distributed; but, unlike iron, is chiefly native, and was formerly thought to be restricted (like the other precious metals) to the tropical regions of the globe. In this country it has been found in Devon and Cornwall, South and North Wales, the Lead Hills, Lanarkshire, Perthshire, and recently in Sutherland, and to the close of the last century in Wicklow, where about 10,000 pounds was obtained. In Europe it was found in Bohemia, Austria, Hungary, Transylvania, where it is now worked, in the sands of the Danube, the Rhine, the Rhone, and in Spain and Italy. But the largest supply is from European and Asiatic Russia, on the eastern side of the Ural, rarely on the western side, and along the prolongations of the Altai range, which are parallel to the Urals. In Thibet, China, and some parts of India, Japan, and the neighboring islands, and in various parts of the east and west coast of Africa it is also found, whilst in America it occurs on the Atlantic or Appalachian slope, or North and South Carolina, Virginia, Georgia, Tennessee and Alabama. The Pacific slope, embracing more than 1,000,000 square miles of the Rocky Mountains, including California, Nevada, Oregon, besides which Washington, Utah, Montana, Idaho, Arizona and Colorado also produce it. Gold deposits are also met with in Mexico, which is, however, chiefly a silver-producing country. In Central America, Costa Rica, Nicaragua, etc., South America, Brazil, where are the celebrated mines of the St. John del Rey and Minas Geraes, the Taquaril and the Don Pedro North del Rey, it sometimes occurs there with palladium in itaberite, and jacotinga in rocks, associated with gneiss. Brazil produced its largest amount of gold about the middle of the eighteenth century, 1751-61, yielding about 20,000 pounds weight of gold. In Peru, about Huaylas and Tarma, and in the valley of Chuquiaguillo, chiefly in alluvium, derived from Silurian rocks. In Bolivia, chiefly along and in the streams that flow down the eastern side of the Cordillera, at the sources of the Rio Grande, and at Tipuani, near Sorato, the beds, called *veneros*, are clays covered by sands and gravels. In Chili gold occurs of two geological ages. Firstly, in the *old granites*, which break through the slates and schists of the coast; and, secondly, in the diorites, traversing the newer strata, including those of the cretaceo-oolitic period. Gold occurs in the granite, which is much decomposed, and in the quartz veins in the schists. The greater mineral wealth of Chili is in the lodes which traverse the liassic, oolitic, and cretaceous strata when associated with the diorites.

In British possessions gold occurs variously distributed through the length of Nova Scotia, where it was first discovered in 1860, in rocks of Silurian age, associated with granite, which cover an area of 4,000 square miles. Mr. HINDE considers that the gold was contemporaneously deposited with the sediments in the ocean, and subsequently concentrated, so as to form contemporaneous veins, as there is no evidence that intrusive rocks or dykes had any share in its introduction; he shows also that the Silurian rocks with gold veins are overlain unconformably with the lower carboniferous conglomerates, containing gold, covered by beds of shale and sandstones, and other conglomerates, about 600 feet thick. Gold was found near Chandiere, in Canada, in 1847; in British Columbia, in 1856, on the Fraser river and its tributaries from the Rocky Mountains, both in the terraces and in the beds and shores of the stream, and at Cariboo, which is the largest and richest district. The gold regions appear to be a continuation of those of Oregon, and probably of the same age as the gold field of California. In Australia, the Victoria colony is the most productive; gold was first found at Clunes in 1850. Gold is abundantly distributed in various parts of South Australia, New South Wales, Queensland and Victoria, whence such enormous supplies have been received during the last ten to fifteen years, the yield of which district in 1869 was about 1,340,838 ounces. It is also worked in Tasmania, and in the Marlborough, Nelson, Canterbury and Auckland districts of New Zealand, where it was noticed in 1842.

As regards geological distribution, gold occurs, as before stated, chiefly in a native state, and is found distributed in igneous or pseudo-igneous rocks, as granite, diorite, porphyry, &c., and in altered sedimentary or schistose rocks, somewhat of a talcose nature, belonging chiefly to the Silurian, but also of cretaceo-oolitic age; *in quartz* veins traversing these rocks, and in superficial or *alluvial* deposits derived from the disintegration of the former. The subject of mineral veins has long occupied the attention of geologists, chemists and mineralogists, and many suggestions or theories have been proposed to account for them from the time of WERNER, or even earlier, to the present period; and heat and water have been both suggested as the *cause* of their origin. Now, mineral veins, or lodes, are fissures in the rocks, which in most cases may have been produced by their contraction, or by various cosmical changes which the more solid parts of the earth's crust have undergone, and occur in harder rocks, or those which have been subsequently opened, and generally in proximity to, or connected with, masses, or dykes, of igneous matter. These veins having been filled by mineral solutions from above, according to the opinion of WERNER, or by other modes of aqueous deposition, by sublimation in vapor and deposition, by intrusion of the materials in a molten state, by segregation during consolidation from the surrounding strata, or by electric action in some way arranging their contents. The subject is one of difficulty, and equally applies to gold.

Now, vein gold was for a long time considered to be restricted to the older palæozoic rocks, chiefly the Silurian, as advocated by Sir R. MURCHISON, in "Siluria;" and although more abundantly found in that group than in other rocks, late researches have shown that still newer formations, as the liassic, oolitic and cretaceous strata, equally contain vein gold; and we owe to Mr. DAVID FORBES a further interesting and suggestive fact, that there appears to have been two great epochs of gold intrusion connected with two different kinds of igneous matter—the granites and diorites—the former of Silurian or palæozoic age, the latter post-oolitic, or in part cretaceous, a suggestion to which attention in the favorable localities should be directed. The older are the most numerous, and to this period belong Sutherland, North Wales, the Urals, Altai, Nova Scotia, Canada, California in parts, Central America, Chili, Bolivia, Brazil and Australia, while to the latter beds are assigned certain gold veins of California, and some in Peru, Bolivia and Chili.

With regard to the period of introduction of the gold into the veins, Sir R. MURCHISON, from his investigation of the Urals, is inclined to believe that it was comparatively modern, and near to the Pliocene period, basing his views on the fact that no gold had been found in those deposits, which, earlier than the tertiary, had been formed out of the pre-existing Silurian strata, such as the Permian conglomerates. The mode of filling the quartz gold veins has been variously described, as previously mentioned, either by concentration from the surrounding matrix, by the intrusion of the silica in a molten state with the gold, or by the agency of solutions holding quartz, gold and other metallic substances, which have been subsequently decomposed, or by sublimation or segregation. To whatever cause they may be attributed, there are the gold veins in comparative abundance in the rocks to which I have alluded, and deep in the earth as these may be traced, we can scarcely realize their former extension upwards without fully considering the enormous amount of surface denudation to which the respective areas have been subject, from which the large amount of gold is annually obtained, because it is this latter source which affords the chief supply. Gold occurs in two kinds of mines—placer and vein mines. He then considered three or four points connected with the subject of alluvial gold.

1. The original quartz veins in the rocks containing gold.
2. The nature of the alluvial strata, their age, character, and mode of occurrence.
3. The origin of these deposits.
4. The state in which the gold is found in these beds, as to form, size and character.

1. The filling of the veins has been already described. The gold is found in them in various modes, either crystallized, in threads or strings, in thin plates or lumps, in spangles and scales, distributed through the quartz, or occurring on it or mixed with copper and iron pyrites, or other metallic ores, as stibnite, valentine, &c.; it is never quite pure, but generally alloyed with silver.

2. The alluvial deposits of placers, pay-dirt, wash-dirt, diggings, etc., are of late Tertiary age, and consist of sand, gravel, clay, and ferruginous matter, more or less alternately arranged, and sometimes compact, or cemented together. Rarely, if any, traces of marine remains have been found in them, but bones of terrestrial animals belonging to the later or newer Pliocene period, as the Mammoth, in Siberia, and the extinct mammals in Australia, or to some slightly older bed. These deposits are of various kinds and positions, occurring at different elevations down to the sea level, and generally occupying old valleys or river courses, and are sometimes covered by sheets of volcanic matter, as in Victoria and California.

3. They have been caused by the general disintegration, either atmospheric or marine, to which the area has been subject, and thus deposits of many feet in thickness have been formed, which have been re-arranged and sorted by rain, streams and rivers. As examples, we may cite those of Russia, California, Australia, and many other localities.

4. The gold is found of various sizes, from large pieces or nuggets, to small grains or scales, and is generally said to be purer than the reef-gold, the size of the nuggets in the older drifts being considered to be due to the richness of the upper part of reefs now destroyed, or to subsequent segregation in the drifts, according to Mr. SELWYN, or to being chiefly found in the *upper* drifts of the valleys, their purity being attributed to the removal of the extraneous matter by chemical action.

Attention was also directed to the minerals which have been mistaken for gold, as iron and copper pyrites, yellow mica, orpiment, chrysolite, also brass filings; and the simplest means of detecting them was pointed out. The economic uses of gold, and some points connected with the coinage, were alluded to, in which the standard for gold in the British Mint (11 gold to 1 alloy) was that of Russia, Turkey, Portugal and Brazil, while the alloy of 9 to 1 was used by France, Belgium, Switzerland, Italy, Spain, Greece, Holland, and the United States. Reference was also made to the care used in the refining of the gold for coinage, showing that even 1-2,000th part of bismuth, lead, antimony, and arsenic would render the gold brittle; and also to some points on the volatility of silver and gold, but on these and other subjects the lecturer referred to the able and valuable report of Mr. CHANDLER ROBERTS, forming part of the General Report on European Mints, just published by authority.—*London Mining Journal.*

Gelatinous Precipitates.

By THOMAS N. CHATARD.

The inconvenience and loss of time which attend the washing of gelatinous precipitates are familiar to all chemists. Even the methods of washing recently introduced by BUNSEN are not always perfectly satisfactory in their operation when applied to this class of substances. The following method will be found, I think, to give rerults which leave nothing to be desired: The solution containing the substance to be determined is to be simply evaporated by perfect dryness with a small excess of the precipitant, and the gelatinous mass stirred with a rod until it becomes a perfectly dry powder. In this manner the precipitate diminishes extremely in bulk, and may then be washed with the greatest ease upon the filter. The evaporation is usually effected with sufficient rapidity on a water bath. The following analysis will be sufficient to show the degree of precision attainable by this process in the cases of some of the more familiar precipitates: Weighed portions of potassic dichromate were dissolved in very small portions of water, reduced with chlorhydric acid and alcohol, the excess of alcohol expelled, and ammonia added in excess. After evaporation, in the manner above described, the chromic sesquioxide presented a greenish blue granular powder very easily washed.

0·7782 gr. $K^2Cr^2O^7$ gave 0·4023 gr. Cr^2O^3—68·02 per cent. chromic acid.

1·5646 gr. $K_2Cr^2O^7$ gave 0·8102 gr. Cr^2O^3—68.13 per cent. chromic acid.

The formula requires 68·04 per cent.

Alumina, treated in the same manner, is also very easy to wash.

2·4097 gr. potassic alum gave 0·2626 gr. Al_2O_3—10·89 per cent.

1·9571 gr. potassic alum gave 0·2130 gr. Al^2O^3—10·88 per cent.

The formula requires 10·86 per cent.

The process applies with almost equal advantage to iron. Weighed portions of ammonio-ferrous sulphate were dissolved in water, and sodic chloride added in large excess, to furnish solid matter to be washed out. The iron was then oxidized with nitric acid, precipitated by ammonia, and evaporated as above.

1·5824 gr. gave 0 3229 gr. Fe_2O_3—14·28 per cent. iron.

1·4840 gr. gave 0·3019 gr. Fe_2O^3—14·24 per cent. iron.

The formula requires 14·29 per cent.

Nickelous carbonate also loses its gelatinous character when treated as above. 0·2201 gr. metallic nickel gave, after solution, precipitation as carbonate, and reduction by hydrogen, 0·2199 gr. metallic nickel—99·91 per cent. of the quantity taken. Cobaltous carbonate may be treated in the same manner, but the alkali cannot be completely washed out, and the

method is, in this case, not to be recommended. It seems, at least, extremely probable that other gelatinous oxides and hydrates will give equally good results when treated in the manner which I have described—*American Journal of Science.*

Discovery and Invention.

DISCOVERY is an advance in science ; invention is an advance in art. By the first our knowledge is increased ; by the second it is applied. The mathematician *discovers* the properties of geometrical figures, after which he may *invent* instruments by which some of these properties can be demonstrated to the eye. The astronomer discovers the motion of the heavenly bodies by means of the telescope which he has invented ; and this invention has resulted from the discovery that rays of light were refracted or bent in a certain manner when they passed from one medium to another, from air to glass. What we discover has previously existed ; what we invent is new. The blood flowed nowise differently after HARVEY discovered its circulation through the body, and the planet Uranus moved on in the same course after Sir WILLIAM HERSCHEL's laborious scrutiny of the heavens found out its path among the stars ; but, on the other hand, when WATT invented the condensing chamber for steam engines, he called into existence a host of machines that had never before been dreamed of ; and when ELIAS HOWE succeeded in producing a piece of mechanism that would sew, a legion of mechanics and inventors were set to work. Discovery, therefore, is principally applied to speculative objects; invention to the mechanical arts.

But, though the two processes are perfectly distinct, they are intimately connected. The progress of civilization involves them both, and they go hand in hand together to perfection. Sometimes an invention follows directly from a discovery, the same man making both. For instance, when Dr. FRANKLIN had discovered the identity of lightning and electricity, his knowledge of the properties of conductors at once suggested to his mind that pointed rods of iron fixed near houses, but isolated from them, would serve to conduct away and dissipate electrical charges that might otherwise cause damage. By far the greater number of inventions, however, consist in skillful re-arrangements of things that are already well known. Familiar combinations of screws, levers and wheelwork are slightly changed, differently put together, and perhaps the result is of more importance to the world than a hundred battles.

Discoveries may sometimes be made by chance ; a man may pick up a diamond where he had stooped down to hunt a lost pin. This is, however, but seldom the case. "Depend upon it," says Miss AUSTEN, "a lucky guess is never merely luck—there is always some talent in it." It is by constant application that the greatest minds are able to make additions to science. When NEWTON was asked by what means he had worked out his extraordinary discoveries, he replied, "By always thinking unto them." "I keep the subject continually before me," he said at another time, "and wait till the first dawnings open slowly, by little and little, into a full and clear light." Inventions still more certainly require continuous labor. The inventor studies all things that may by any possibility serve his purpose ; and not till he has become perfectly familiar with their action in the connections in which he finds them, can he conceive what it will be in other connections. When he can think his inventions out, he may try them ; but first he must acquire "the art of seeing the invisible ;" he must form his machine in his mind.

Thus, when WATT was asked if he remembered how the first idea of his great invention occurred to him, he replied : "Oh, yes, perfectly. One Sunday afternoon I had gone to take a walk in the Green of Glasgow, and when about half way between the Herd's house and Arn's well, my thoughts having been naturally turned to the experiments I had been engaged in for saving heat in the cylinder, at that part of the road the idea occurred to me that, as steam was an elastic vapor, it would expand and rush into a previously exhausted space ; and that if I were to produce a vacuum in a separate vessel, and open a communication between the steam in the cylinder and the exhausted vessel, such would be the consequence." The object of this exhausted vessel was to furnish a place in which a jet of cold water could condense the steam, the thing needed to make his engine complete in his mind. Its after-construction was a mere mechanical matter. One of our greatest inventors is said to do most of his work while sitting in a rocking-chair and smoking cigars. He is in reality trying his machines all the while. He tightens a screw and observes the effect ; he lengthens a lever and observes the effect ; he wants to push a certain bar back to its place, after every time that it is pushed forward by an eccentric ; he tries another eccentric for this purpose, and finds it in the way ; he puts it in an out of the way part of the mechanism, and attaches a small lever to it which reaches the bar. All this is done, and every part tested over and over again in thought, before even a model is made.

Besides imagination, or rather vivid and truthful conception, the inventor must possess concentration of mind. "The most successful minds work like a gimlet—to a single point." When a man of genius becomes thoroughly possessed of one idea, overpowered by it ; when he ponders over it by day and dreams of it by night ; when he sacrifices health, wealth and contentment to the one hope that is wearing him away, his body growing feeble, his brow wrinkled, his family as well as himself destitute, pinched by hunger and cold, yet with all this will not give up his seemingly fruitless pursuit, we may well suspect that there is something in it. Thus PALISSY, the potter, spent sixteen years of his life in anxious experiments on enamel. He had fixed his mind on that. He had conceived an ideal that he felt must be realized. We read the story of his sufferings, and feel that the final triumph was no sufficent compensotion for trials like these. What can be the divine madness that seizes on a man and will not let him go till he satisfies the demon, performs his allotted work, and sinks into the grave, wearied of a life without rest or ease? PALISSY built and rebuilt his furnaces, burnt his clay day after day, year after year, in vain, mixed it with various ingredients, and covered it with ever-varying preparations, only to meet with one disappointment after another. His wife and family frequently wanted food and clothing. His neighbors suspected him of sorcery, and began to look upon him with terror : still the furnaces smoked on. His friends remonstrated ; his wife expostulated ; there was talk of insanity and confinement. When his last workman left him he had no money, and had to give for wages the few clothes he had left and not actually in wear. He had now to work alone, to prepare his clay and colors, and jealously watch his furnace. His wood was all consumed one day, just when a vase, on which all his hopes were centred, was burning in the oven. The fire was nearly exhausted. He rushed frantically to his house and broke in pieces his chairs and tables, then the door, the window-frames, finally the very flooring, to feed the flames. At last it was done. The vase was taken out of the furnace bright with the imperishable colors that his imagination had been painting for sixteen weary years. Was it worth while, after all? Not for his own happiness, certainly. But the world's progress is mainly due to men who aim at other ends than happiness. A man must give himself to his art.

Sacrifices like these are frequently undergone by inventors ; but the great discoverer is not often called upon to make them, though in an ignorant age, or a bigoted one, he may endanger his life. The genius of the inventor is frequently undisciplined by culture ; he is perhaps a workman of slender means and narrow views ; hence the overpowering force with which his one idea seizes him. The discoverer, on the contrary, he who enlarges the boundaries of knowledge by important truths, must be both a genius and a scholar, a man of broad views, many-sided, healthy, up to the level of science in his time. Such conditions almost presuppose pecuniary independence. Hence, in reading the lives of the great lights of science—PYTHAGORAS, ARCHIMEDES, COPERNICUS, NEWTON, etc.—we generally find them men of standing and influence, men who have leisure enough to devote themselves to science, and education enough to bring all varieties of existence within their ken. For want of this thorough scientific training, inventors are continually forced to test every step of their work ; and it may be that only after hundreds of failures any success is achieved. Though, as Mr. SMILES says, "the steam-engine was nothing until it emerged from the state of theory, and was taken in hand by practical mechanics," it must be remembered, also, that without theory it could never have been thought of, and that ignorance of scientific truths is often the most serious hindrance to practical men in their inventions. If GOODYEAR had known that oil of vitriol contained sulphur, he might have been able to utilize India-rubber in three years, instead of ten, after he had made that the purpose of his life. He found that oil of vitriol (he did not know it by the name of sulphuric acid) would sometimes produce upon the pure gum the very effect that he wanted and he wasted time in numerous experiments trying to render that effect permanent, when a chemist would have suspected that the sulphur in the acid was the real agent, and have taken the steps at once that GOODYEAR took years later.

Perhaps the greatest, the most complete and powerful mind among men, is that of the man who is at once a great discoverer and great inventor. ARCHIMEDES, NEWTON and FRANKLIN are illustrious examples. The ancients attribute to ARCHIMEDES more than forty mechanical inventions, prominent among which is the endless screw, which he thought out while travelling in Egypt, reflecting on the necessity of raising the water of the Nile to points which the river did not reach. He likewise applied it as a pump to clear water out of the holds of vessels, to launching ships, and to propelling them through the water, a use which is still retained. The precision with which he directed his thoughts to the attainment of any desired result is well shown by his detection of the fraud practised on HIERO, King of Syracuse, by a goldsmith to whom the king had intrusted a certain weight of gold to be made into a crown. The king suspected, when he received the crown, that the gold had been adulterated, and he applied to ARCHIMEDES for a test. The difficulty was to measure the bulk of the crown without melting it into a regular figure. It was of the proper weight ; hence, if any alloy had been substituted for a part of the gold, the bulk would be necessarily increased. ARCHIMEDES kept the subject continually in his thoughts, and the conditions of the problem became so clear to his mind that when he stepped into a bath one day, the vessel being full and water flowing over, he comprehended in an instant that the amount of water flowing over was equal in bulk to the body immersed. It followed at once that if the crown would displace more water than an equal weight of pure gold, it had been fraudulently adulterated. Without a moment's delay he jumped from the bath and ran to his own house, crying triumphantly, "Eureka ! Eureka !" Yet, notwithstanding his ability in the application of scientific principles, he regarded his inventions as contributing far less to his glory than the additions which he made to speculative truth. "He was half ashamed," says Lord Macaulay, "of those inventions which were the wonder of hostile nations, and always spoke of them slightingly, as mere amusements, as trifles in which a mathematician might be suffered to relax his mind after intense application to the higher parts of the science." He knew the superior value of his purely theoretical pursuits as mental discipline, and as indications of mental power. Hence he requested that his memory should be perpetuated as far as he could determine the manner of it, by his discovery that a sphere is exactly two-thirds of the circumscribing cylinder ; and, accordingly, a sphere inscribed in a cylinder was sculptured on his tomb.

Before quitting this subject, it may be well to notice the fact that inventions are largely based on the state of knowledge at the time, and are consequently often claimed by several persons who have worked independently of each other. Invention is at once the cause and the measure of civilization. When the world was ripe for printing, printing was accomplished, either by KOSTER, GUTENBERG, FAUST or SCHOEFFER. When the telescope was needed, the telescope must be invented, whether by HANS LIPPERSHEY or GALILEO. The honors of the steamboat are disputed, and claimed by almost every civilized country under the sun. A want thoroughly felt tends to bring out its supply. It would be interesting to look over the records of the Patent office to find out in what year the people of the United States felt most keenly their need of improved mouse-traps, and when the imperfection of their coffee-mills became a burden. Even in these things, demand determines supply, and anxiety for perfection in the merest trifles is an indispensable condition of progress.—*Am. Ex. and Review.*

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110,374.—BRAIDING-GUIDE FOR SEWING MACHINES.—Albert Komp, New York, N. Y.

110,375.—STONE-DRILLING AND CHANNELING MACHINE.—Ebenezer G. Lamson, Windsor, Vt.

110,376.—STONE-CHANNELING MACHINE.—Ebenezer G. Lamson, Windsor, Vt.

110,377.—BREAST-COLLAR FOR HORSES.—William E. Leonard, Boston, Mass.

110,378.—CASTING CHILLED ROLLS.—George G. Lobdell and William Stuart, Wilmington, Del.

110,379.—CARTRIDGE-BOX.—John C. Dudlam, Brooklyn, N. Y.

110,380.—PUMP.—Robert Mudge Marchant, London, England.

110,381.—TABLE-FAN.—Joseph C. McEwen, Micanopy, Fla.

110,382, antedated December 9, 1870.—ELEVATOR FOR MERCHANDISE.—William McNaughten, Utica, Ohio.

110,383.—SHOT-CARTRIDGE.—Richard R. Moffatt, Brooklyn, N.Y.

110,384.—RAILWAY RAIL-JOINT.—William Morehouse, Buffalo, N Y.

110,385.—METHOD OF FORMING SHAFT-IRON FOR CARRIAGES.—Francis B. Morse, Plantsville, Conn., assignor to himself and H. D. Smith & Co., same place.

110,386.—CLIP-BAR FOR CARRIAGES.—Francis B. Morse, Plantsville, Conn., assignor to himself and H. D. Smith & Co., same place.

110,387.—BASIN-COCK.—Charles A. Newton, Providence, R. I.

110,388.—LAWN-MOWER.—Augustus J. Ohmer, Hamilton, Ohio.

110,389.—COMBINED PARLOR AND COOKING STOVE.—William W. S. Orbeton, Bradford, Mass.

110,390.—SAW-TOOTH SWAGE.—Gordon Burleigh Pattee, Ottawa, Canada.

110,391.—STOP-VALVE.—Robert Pilling, Waterford, N. Y.

110,392.—STUFFING-BOX.—Andrew J. Prescott, Catawissa, Pa.

110,393, antedated December 13, 1870.—COTTON-PLANTER.—Blackman Asbury Ramsey, Trenton, Tenn.

110,394.—REFRIGERATING-CAR.—Thomas L. Rankin, Granville, Ill.

110,395.—FOUNDATION FOR PAVEMENTS.—Selah Reeve, Chicago, Ill.

110,396.—VEHICLE.—John D. Ross and Martin Keeyer Burke, Truckee, Cal.

110,397, antedated December 9, 1870.—GRINDING-MILL.—John H. Rusk, Philadelphia, Pa.

110,398.—MACHINE FOR TURNING LOGS.—Edward H. Stearns, Erie, Pa

110,399.—PIPE AND TUBE FOR WATER AND GAS.—Henry M. Stew, San Francisco, Cal.

110,400.—COOKING STOVE.—David Stuart and Lewis Bridge, Philadelphia, Pa., assignor to Stuart, Peterson & Co., same place.

110,401.—WHEEL-PLOW.—John H. Suydam, Atwater, Minn.

110,402.—SEAT-HINGE FOR SCHOOL-DESKS AND SETTEES.—Nelson O. Tiffany, Buffalo, N. Y.

110,403.—BARK-ROSSER AND BREAKER.—George S. Tillinghast and John W. Burdwin, Morrisville, N. Y.

110,404.—STONE-CHANNELING MACHINE.—Francis C. Treadwell, Jr., New York, N. Y., and Ebenezer G. Lhasom, Windsor, Vt. ; said Treadwell assigns to said Lamson.

110,405.—PORTABLE DRILLING-TOOL.—Claus Van Haagen, Philadelphia, Pa., assignor to himself and Anthony Van Haagen, same place.

110,406.—GEAR-CUTTING MACHINE.—Claus Van Haagen, Philadelphia, Pa., assignor to himself and Anthony Van Haagen, same place.

180,407.—GROOVING-TOOL.—Claus Van Haagen, Philadelphia, Pa., assignor to himself and Anthony Van Haagen, same place.

110,408.—SILVERING GLASS.—Henry Balen Walker, New York, N. Y.

110,409.—SCRUBBER AND MOP.—William Penn Walker and Ernest Henry Leseman, Toledo, Ohio.

110,410.—IRONING-TABLE BUREAUS.—Margaret White, Saratoga Springs, N. Y.

110,411.—COTTON-PLOW.—James Wiley, Warsaw, N. C.

110,412.—LOCK.—Horatio Willard, Evansville, Ind.

110,413.—CHAIR.—Jackson C. Zimmerman, Thomaston, Ga.

110,414.—APPARATUS FOR SUPPLYING AIR.—Henry W. Adams, Philadelphia, Pa.

110,415.—WOOD-SPLITTING MACHINE.—William A. Allen, Baltimore, Md.

110,416.—RAILROAD-CAR VENTILATOR.—George B. Armstrong, Chicago, Ill., and George F. McLellan, Washington, D. C.

110,417.—PLOW.—James Archer, Springfield, Wis.

110,418.—MACHINE FOR BURRING WOOL ON THE SKIN.—Edward H. Ashcroft Lynn, Mass.

110,419.—CULTIVATOR.—Robert H. Avery, Galesburg, Ill.

110,420.—COFFEE-POT STRAINER.—George A. Barron, Pembroke, Me.

110,421.—BOTTLE-FASTENING.—Benjamin Bates, Baltimore, Md.

110,422.—COUPLINGS FOR SHAFTING.—Charles Bean, Providence, R. I., assignor to Albert F. Allen, same place.

110,423.—MEDICAL BITTERS.—Theodore Beck, Omaha, Nebraska.

110,424.—TAKE-UP MECHANISM FOR SEWING-MACHINES.—Walter Bennett Springfield, Ill.
110,425.—MIDDLINGS-PURIFIERS.—Lemuel G. Binkley, Baughman, Ohio.
110,426.—THUMB-SUPPORTER.—James Sanford Borden, Bloomfield. Ill.
110,427.—METHOD OF PRODUCING ILLUMINATING GAS.—John F. Boynton, Syracuse, N. Y.
110,428.—PORTABLE FARE-BOX.—Alfred Bradley, New Orleans, La., assignor to himself and W. L. Cushing, same place.
110,429.—CHURN-DASHER.—Robert Brown, Columbus, Miss.
110,430, antedated December 9, 1870.—SAW-TEETH.—Isaiah Byrd and Turner Byrd. Jr., Calvin Township, Mich.
110,431.—WIRE FOR MAKING PEGS FOR BOOTS AND SHOES.—Duncan H. Campbell, Sunderland, Scotland, and Erastus Woodward, Charlestown, Mass.
110,432.—LUBRICATING COMPOUND FOR STEAM AND OTHER PACKING.—William M. Canfield, Philadelphia, Pa.
110,433, antedated December 15, 1870.—BOOT-JACK AND DOOR-BUFFER.—Walter S. Chatham, Williamsport, Pa., assignor to John W. Riddell, same place.
110,434.—UMBRELLA-HOLDER.—Almon Clarke, Sheboygan Falls, Wis., assignor of one-half his right to Charles A. Spencer, same place.
110,435.—ASTRONOMICAL LANTERN.—James Freeman Clarke, West Roxbury, Mass.
110,436.—TIDAL MOPIVE-POWER.—Walter R. Close, Bangor, Me.
110,437.—DIE-PLATE FOR SCREW-CUTTING DIES.—William T. Cole, New York, N. Y.
110,438.—FOLDING-CHAIR.—Francis Colton, Brooklyn, N. Y.
110,439.—FASTENING FOR NECK-TIES.—William J. Cowing, Washington, D. C.
110,440.—MACHINE FOR GROOVING BLOCKS FOR WOOD PAVEMENTS. Perley D. Cummings, Portland, Me.
110,441.—SELF-CLEANING-LOCOMOTIVE SMOKE-STACK.—Samuel M. Cummins and Henry Isreal, Allegheny, Pa., assignors for one-third their right to Ransom C. Wright, same place.
110,442.—PRESS FOR HAY, COTTON, &c.—Matthew G. Cunningham, Corsicana, Texas.
110,443.—HAY AND COTTON-PRESS.—Joseph K. Davis, Monticello, S. C.
110,444, antedated December 15, 1879.—CARRIAGE WINDOW.—James F. Dohan, Binghamton, N. Y.
110,445.—GRAIN-SEPARATOR.—James W. Donaldson, Fairfield, Cal.
110,446.—SNOW-PLOW FOR RAILWAYS.—Tiberius Dongherty, Philadelphia, Pa.
110,447, antedated December 10, 1870.—COMBINED BROADCAST SEEDER AND CULTIVATOR.—Joseph E. Fargo, Lake Mills, Wis.
110,448.—DEVICE FOR SIGHTING AND FIRING ORDNANCE.—George K. Farrington, Alcatraz Island, Cal., assignor to himself, Lorenzo Hubbard, and C. W. M. Smith.
110,449.—LENS OR GLASS FOR HEAD-LIGHTS.—Henry C. Felthousen, Buffalo, N. Y.
110,450.—BUSHING FOR WARP-BEAMS.—Richard Ferguson, Louisville, Ky.
110,451.—SAW-MILL.—Charles M. Flint, Hancock, N. H.
110,452.—DRIP-ATTACHMENT FOR UMBRELLAS.—Thaddeus Fowler, Tottenville, N. Y.
110,453.—WASHING-MACHINE.—Abram A. Gardner, Savannah, Mo.
110,454.—INCUBATORS.—Jacob Graves, Reading, and Henry Graves, Boston, Mass.
110,455, antedated December 22, 1870.—POWER-PRESS.—Albert D. Hamlin, Brooklyn, N. Y., assignor to Mays & Bliss, same place.
110,456.—FLOUR-BOLT.—Cyrus T. Hanna, Keokuk, Iowa.
110,457.—LAWN-MOWER.—Hubert C. Hart, Unionville, Conn.
110,458.—CORN-PLANTER.—Charles Allen Haskell, Galena, Ill.
110,459.—CANAL-LOCK MECHANISM,—George Heath, Annapolis, Md.
110,460, antedated December 24, 1870.—GAUGE FOR TURNING CLOCK-WORK.—Harry F. Henderson and James E. Ladd, Bristol, Conn.
110,461.—NON-CONDUCTING COMPOUND FOR COATING STEAM BOILERS, &c.—John Hessing, Paterson, N. Y.
110,462.—MACHINE FOR CUTTING THE ENDS OF HOOPS.—Lorenzo N. Hewes, Swansey, N. H.
110,463.—COMPOUND AND PROCESS OF REMOVING INCRUSTATIONS OF LIME FROM STEAM BOILERS, METALS, &c.—J. Austin Hewitt, Nora Springs. Iowa.
110,464.—LAMP.—Charles F. A. Hinrichs, New York, N, Y.
110,465.—MANUFACTURE OF LEATHER.—Frederick A. Holcomb, Grand Rapids, Mich., assignor to himself and Samuel B. Jenks.
110,466.—PROPULSION OF CANAL BOATS.—Julius L. Hornig, Chicago. Ill.
110,467.—FIRE-BOX FOR STOVES AND RANGES.—Marcus L. Horton. Windsor, Vt.
110,468, antedated December 9, 1870.—DEVICE FOR FILLING LOWLANDS.—George Howell, Philadelphia, Pa.
116,469.—REFINING OF OIL FROM COTTON-WASTE, &c.—Edgar T. Jarrold, Tottenville, assignor, by mesne assignments, to himself, Henry S. Gerow, and Henry McLean. of New York City, N. Y.
110,470.—MEDICAL COMPOUND FOR RHEUMATISM.—Nathaniel Jenkins, New Orleans, La.
110,471.—SPRING-BED BOTTOM.—William B. Judson. Poughkepsie, N. Y., assignor to I. P. Nelson, Jr.
110,472, antedated December 17, 1870.—BASE-BURNING STOVE. William Kaiser, Wilkesbarre, Pa.
110,473.—SPICE-BOX.—Edward S. Kennedy, Birmingham (Birmingham Post-office), Pa.
110,474.—SCYTHE-FASTENING.—Samuel U. King, Windsor, Vt.
110,475.—SMUT-MACHINE.—William H. Kite and George S. Newman, Liberty Mills, Va.
110,476.—ATTACHMENT FOR RATLINS.—John Calef Knowlton, Rockport. Mass.
110,477.—VINE AND WEED-CUTTER.—Harry Lawrence, NewYork, N. Y.
110,478.—WASHING-MACHINE.—Balaam Chaffin Lawson, Yolo County, Cal,
110,479.—KNITTING MACHINE.—John Lee, Mark Lee, and William Carter, Needham, Mass.
110,480.—NEEDLES AND THEIR CARRYING-ARMS FOR SEWING-MACHINES.—George A. Lloyd, San Francisco, Cal., assignor to himself, George W. Smiley, James McMeehan, and Anthony Rosenfield,
110,481.—COMPOUND FOR CLEANING CARPETS.—Leo. Marks, Cincinnati, Ohio.
110,482.—WASHING-MACHINE.—Moses S. Marshall, Somerville, assignor to John T. Folsom and John S. Folsom, Boston, Mass.
110,483.—CONSTRUCTION OF PRISONS.—Edwin May, Indianapolis, Ind.
110,484.—WATER-FAUCET.—Pierre A. Maoor, New York, N. Y.
110,485, antedated December 16, 1870.—CAMP-BEDSTEAD.—Amos Dunham McCoy, Alexandria, La.
110,486.—AUEOMATIC DOOR-BOLT.—Angus McKay, Montreal, Canada.
110,487.—CHURN-DASHER.—James B. Mellor, New Hope, Mo.
110,488.—FILTER-TANK AND OTHER VESSELS USED IN REFINING SIRUPS, SUGAR, &c.—William Moller, Irvington, N. Y.
110,489.—TREATING BESSEMEL STEEL.—James Myers, Jr., Williamsburg, N. Y.
110,490.—BALANCED SIDE-VALVE.—John Nesbitt, Concord, N. H.
110,491, antedated December 15, 1870.—KEY FOR LOCKS.—Webster Park. Norwich, Conn.
110,492.—GRAIN-BINDER.—La Fayette Parker, Davenport, Iowa.
110,493.—(Suspended.)
110,494.—COUNTERSINK.—Moses Magoon Pettes, Worcester, Mass.
110,495.—CLEANING WOOL, COTTOE, &c.—Goldsbury H. Pond, Rutland, Vt.
110,496.—GAS-RETORT AND HEATING-FURNACE.—Goldsbury H. Pond, Rutland, Vt.
110,497.—RAILWAY-CAR SPRING.—Albert Potts, Philadelphia, Pa.
110,498, antedated December 17, 1870.—GRAIN-BINDER.—Francis W. Randall, Tekonsha, Mich.
110,499.—LOCK-NUT.—James L. Randolph, Berkeley Springs, West Virginia, assignor to G. L. Denny, Christiana, Pa.
110,500.—NAIL FOR PICTURES, &c.—Thomas C. Richards, New York, N. Y.
110,501.—PROPELLING APPARATUS FOR CARS.—John Roy, New Orleans, La.
110,502.—HANLLE FOR BARRELS, &c.—Minot S. Schofield, Stamford. Conn.
110,503.—WHIP-HOLDER FOR CARRIAGES.—Erastus W. Scott, Wauregan, Conn.
110,504, antedated December 16, 1870.—BOTTLE-FILLING APPARATUS.—Thomas Simmons and Cavid H. Lowe, Brooklyn, N. Y.
110,505.—BREECH-LOADING FIRE-ARM.—James Smiles, Birmingmingham, England.
110,506.—PLOW.—Arthur C. Smith, Joyner's Depot, N. C.
110,507.—CABINET FOR SEWING-MACHINES.—James E. Smith, Chicago. Ill., assignor to himself and Julius Ludwig, same place.
110,508.—EYELET MACHINE.—Stephen N. Smith, Providence, R. I., assignor to the Union Eyelet Company, same place.
110,509.—BUCK-SAW.—Ariel B. Sprout, Muncy, Pa.
110,510.—KEY FOR SHAFTING.—Nathan Stedman, Aurora, Ind.
110,511.—BAG-HOLDER.—Alfred D. Swogger, Worth, Pa.
110,512.—TURN-UP SEAT FOR CHURCHES, &c.—James P. Tibbits, New York, N. Y.
110,513.—CARRIAGE-BOW.—Isaac N. Topliff, Adrian, Mich.
110,514.—POTATO-DIGGER—William Tripp, Mechanicsville, N. Y.
110,515, antedated December 10, 1870.—MACHINE FOR HEADING RIVET AND SCREW-BLANKS.—Victor De M. Upham, Brooklyn, N. Y.
110,516.—STILL FOR PETROLEUM AND OTHER OILS.—Samuel Van Syckel, Titusville, Pa.
110,517.—(Suspended.)
110,518.—HORSE-COLLAR PAD.—James F. Walsh, Hazel Green, Wis.
110,519.—TOY-HOOP.—Rivera Ward, Newark, N. J.
110,520.—ADDING-MACHINE.—Francis F. Warner, Chicago, Ill.
110,521.—WINDLASS.—Enos Waterbury and George N. Waterbury, Stamford, Conn., assigners to G. N. Waterbury and A. M. Prior, same place.
110,522, antedated December 17, 1870.—PRINTER'S INKING-ROLLER.—Charles S. Westcott, Elizabeth, N. J., assigoor to himself, John Austin, Rollin Germain, New York City, and William H. H. Williams, Middletown, Conn.
110,523.—ROLLER-LIFTING POWER.—Elisha Whitcomb, Waterville, Ohio.
110,524.—LOOM.—Robert Whitehill, New York, N. Y., assignor to the Positive-Motiou Loom Company, same place.
110,525.—SUBSOIL-PLOW.—Tolbert G. Wilder, Camden, Miss.
110,526.—LAMP.—Thomas Scott Williams, Boston, Mass., assignor to himself and Phillip S. Page, same place.
110,527, antedated December 17, 1870.—SEAT-GUARD FOR HOBBY-HORSES.—William L. Williams, New York, N. Y.
110,528.—RUNNING-GEAR FOR CARRIAGES.—Jerome B. Withey, Detroit, Mich.
110,529.—MACHINE FOR MAKING BRUSHES.—Oscar D. Woodbury, New York, N. Y.
110,530.—BORING-MACHINE.—Edward J. Worcester, Worcester, Mass.
110,531.—COTTON-CULTIVATOR, SCRAPER, AND CHOPPER.—John H. W. Young. Henderson. Texas.
110,532.—WOOD-SCREW MACHINE.—James M. Alden, New York, N. Y., assignor to International Screw-Nail Company, same place.
110,533.—TREADLE.—Arthur M. Allen, New York, N. Y.
110,534.—COPE FOR CASTING CAR-WHEELS.—Albert Alling, Chicago, Ill.
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110,536.—PAPER-BAG MACHINE.—Charles F. Annan, Boston, assignor to himself and Herbert S. Merrill, Cambridge, Mass.
110,537.—ADJUSTABLE CAM.—Charles F. Annan, Boston, assignor to himself and Herbert S. Merrill, Cambridge, Mass.
110,538.—PORTABLE-STORE-ROOM AND PANTRY.—Thomas A. Barrell, Maroa, Ill.
110,539.—COTTON-BALE TIE.—George N. Beard, St. Louis, Mo.
110,540.—MACHINE FOR DRYING PAPER AND OTHER FABRICS.—Frederick Beck, New York. N. Y.
110,541.—HORSE-YOKE.—A. B. Beaumont, Austerlitz, Mich.
110,542.—GRAIN-THRASHER, SEPARATOR, AND CLEANER.—Edgar M. Birdsall, Penn Yan, N. Y.
110,543.—SIFTER.—Sanford O. Blanding, Vineland, N. J.
110,544.—WATER-WHEEL.—John W. Bookwalter, Springfield, Ohio.

REISSUES.

4,215.—HOISTING-BLOCK.—Joseph A. Burr, Brooklyn, assignor to Burr & Co., New York, N. Y.—Patent No. 108,446, dated October 18, 1870.
4,216.—SHOVEL-PLOW AND POTATO-DIGGER COMBINED.—James Millen Dick, Buffalo, N. Y., assignor to himself and William H. Albro, same place.—Patent No. 105,92m, dated August e, 1870.
4,217.—Divisicn B.—HARVESTER.—Rufus Dutton, Yonkers, N. Y.,—Patent No. 31.378. dated February 12, 1861; reissue No. 4,125, dated September 20, 1870.
4,218.—BROILER.—James T. Page, Rochester, N. Y.—Patent No. 106,280, dated August 9, 1870.
4,219.—RESERVOIR COOKING-STONES.—George H. Phillips, Troy, N. Y.—Patent No 86,585, dated February 2, 1869.
4,220.—WATER-PIPE MACHINE.—John W. Stockwell, Portland, Maine.—Patent No. 106,424. dated August 16, 1870.
4,221.—LAMP-CHIMNEY.—The Requa Patent Concave Burner and Chimney Company, New York, N. Y., assignee of E. B. Requa.—Patent No. 37,773, dated February o4. 1863.
4,222.—GANG-PLOW.—George W. Hildreth, Lockport, N. Y.—Patent No. 18,397, dated October 13. 1857.

DESIGNS.

4,535.—FRUIT-GATHERER.—James S. Barry and Alfred M. Barry, Albion, Mich.
4,536.—BACK OF A PLAYING-CARD.—Solomon L. Cohen, New York, N. Y., assignor to Lawrence & Cohen, same place.
4,537.—BACK OF A PLAYING-CARD.—Solomon L. Cohen, New York, N. Y., assignor to Lawrence & Cohen, same place.
4,538.—OIL-CLOTH PATTERN.—Henry Kagy, Philadelphia, Pa., assignor to Thomas Potter, Son & Co., same place.
4,539.—OIL-CLOTH PATTERN.—Henry Kagy, Philadelphia, Pa., assigoor to Thomas Potter, Son & Co., same place.
4,540.—CARPET-PATTERN.—Hugh S. Kerr, Philadelphia, Pa., assignor to Israel Foster, same place.
4,441.—RAILWAY-CAR SASH-LOCK.—William H. Paige, Springfield, Mass.
4,542.—POULTRY-FOUNTAIN.—Beekman Van Gaasbeek, Mount Vernon, N. Y.
4,543.—CHAIN.—Josiah V. Waldron and Charles F. Waldron, New York, N. Y.
4,544.—OIL-CLOTH PATTERN.—John T. Webster, New York, N. Y., assignor to Thomas Potter, Son & Co., Philadelphia. Pa.
4,545.—OIL-CLOTH PATTERN.—John T. Webster, New York, N. N. Y., assignor to Thomas Potter, Son & Co., Philadelphia, Pa.
4,546.—CASE OF A PARLOR-ORGAN.—George Woods, Cambridge, Mass.

TRADE MARKS.

112.—WHISKY.—H. Block & Co.. Cincinnati, Ohio.
113.—BURNING-FLUID.—George M. Danforth, New York, N. Y.
114.—HONOLULU ORANGE-BITTERS.—Robert Des Auges, New York, N. Y.
115.—FERTILIZER.—Dugdale & Girvin, Baltimore, Md.
116.—FERTILIZER.—Dugdale & Girvin, Baltimore, Md.
117.—LEAD-PENCILS.—Eberhard Faber, New York, N. Y.
118.—FURNISHING-GOODS.—Fish, Clark & Flagg, New York, N. Y.
119.—LIQUORS.—Charles H. Ross & Co., Baltimore, Md.
120.—MEDICAL COMPOUND.—Samuel S. Seely, Bath, N. Y.
121.—BURNING-FLUID.—Philip Weisenberger, Pittsburg, Pa.

EXTENSIONS.

EMANUEL ANDREWS, of Williamsport, Pa.—Letters Patent, No. 16,223, dated December 16, 1856; reissue No. 2,290, dated June 19, 1866.
JOSEPH KINGSLAND, Jr., of Franklin, N. J.—Letters Patent No. 16,278, dated December 23, 1866.
JOSEPH KINGSLAND, Jr., of Franklin, N. J.—Letters Patent No. 16,239, dated December 16, 1856; reissue No. 745, dated June 28, 1859; reissue No. 1,380, dated January 6, 1863.
JOSEPH KINGSLAND, Jr., of Franklin, N. J.—Letters Patent No. 16,316, dated December 23, 1856; reissue No. 744, dated June 28, 1859; reissue No. 1,381, dated January 6, 1863.

BUSINESS AND PERSONAL.

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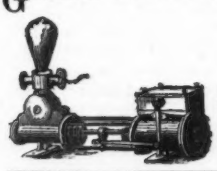

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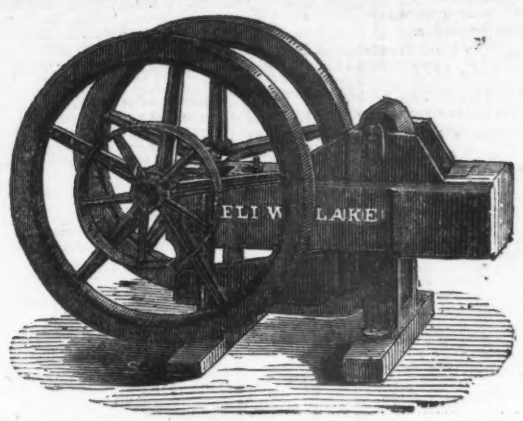

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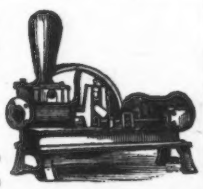

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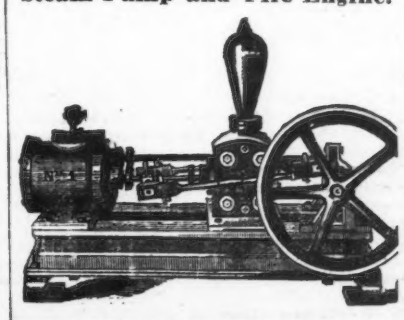

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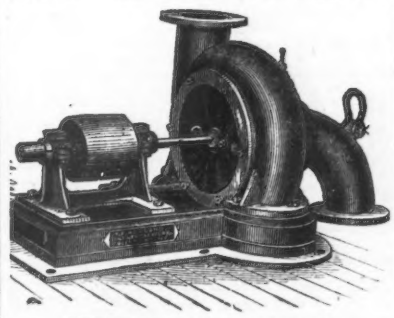

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Our Plan for 1871

IS

CAPITAL WITHOUT STINT

For these purposes, and

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We desire to pay out the coming year not less than a Quarter of a Million of Dollars from our receipts and reserves, for the services of Volunteer Agents alone, in all the States, Territories, and Provinces of North America. Our paper challenges comparison with the best Journals of Arts and Engineering in the world. It is at the same time one of the cheapest publications ever issued from the press; and to all its attractions we now add a range of Premiums tantamount almost to a free gift of our paper, our labor, our earnings, for the year, for the sake of introducing THE MANUFACTURER AND BUILDER to myriads of readers, whose patronage in future years will recompense our present lavish outlay.

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In the following table is given the price of each article, and the number of subscribers required to get it free, at $1 50 a year; also at the club rate of $1 a year. The descriptions of a few articles are given in the fourth column, the balance is given in our *Descriptive Premium Sheet*, which will be sent on application to those who contemplate getting up clubs.

List of Premiums and Terms for Vol. III., 1871.

A Free Field for Everybody. No Competition.

No.	Names of Premium Articles.	Price of Premium.	Number of Subscribers required at $1 50	at $1
	FROM PATTERSON & BROS.			
1	Tool Chest	$45 00	60	190
2	Case Mathematical Instruments	9 00	18	55
3	Case Mathematical Instruments	15 00	22	75
4	Pocket Knife	1 50	4	21
5	Pocket Knife	2 00	5	22
6	Pocket Knife	2 50	6	25
7	Lady's Pocket Knife	2 00	5	22
8	One dozen Knives and Forks	14 00	21	70
9	One dozen Knives and Forks	18 50	27	90
10	One dozen Knives and Forks	22 00	33	110
11	One dozen Knives and Forks	25 50	39	124
12	Carver and Fork	5 00	13	37
13	Fluted Sharpening Steel	2 50	6	25
	FROM HALL, ELTON & CO.'S PLATE.			
14	One dozen Tea-spoons, medallion	5 75	14	40
15	One dozen Table-spoons, medallion	12 00	19	65
16	One dozen Table Forks, medallion	12 00	19	65
17	Butter-Knife, medallion, solid	1 00	4	
18	Soup-Ladle, medallion	5 75	14	40
19	Ice or Water-Pitcher, No. 3	17 00	26	80
20	Pocket Fruit-Knife, No. 12	2 00	5	22
21	Revolving Butter-Cooler, No. 80	8 00	16	52
22	Cake-Basket, No. 1867	10 00	18	58
23	Caster, 6 bottles, chased, No. 2039	9 25	18	54
24	Fruit-Basket, No. 200	13 50	21	75
25	Child's Cup, No. 041	2 75	6	25
26	Knife, Fork, and Spoon, child's set, morocco case	3 00	8	30
27	One dozen Napkin-Rings, medallion	9 00	17	54
28	Tea Set, gold lined, No. 1822	48 00	52	180
29	Tea Set, No. 1866	36 00	45	135
	FROM COLBY BROS. & CO.			
30	Knife-Cleaner	75	2	
	FROM MABIE, TODD & CO.			
31	Gold Pen and Pencil, rubber case	8 00	15	45
32	Gold Pen and Pencil, rubber case	6 75	13	37
33	Gold Pen, silver or gold holder, in box	4 25	9	32
34	Gold Pen, extension gold case, in box	29 00	29	90
35	Lady's Gold Pen, ivory holder, in box	2 75	6	25
	FROM HENRY RUSSELL & CO.			
36	Downer Mineral Oil Lamp, No. 1956	4 75	10	35
37	Downer Mineral Oil Lamp, No. 1963	9 25	17	56
	FROM C. F. A. HEINRICH.			
38	St. Germain Student Lamp, largest size	8 25	15	45
	FROM FAIRBANKS & CO.			
39	Family Scales	14 00	21	70
	FROM COLBY BROS. & CO.			
40	Clothes-Wringer	7 50	10	35
	FROM ALEXANDER M. LESLEY.			
41	Refrigerator, the Zero, No. 38	38 00	42	142
42	Cooler, the Newport, No. 1	12 00	15	45
43	Hot-Air Coal Furnace, the Gothic, No. 9	125 00	135	450
44	Hot-Air Wood Furnace, Gothic, No. 10	150 00	162	525
	FROM THE STANLEY RULE & LEVEL CO.			
45	Iron Smoothing-Plane, Bailey's patent	5 00	13	37
46	Iron Smoothing-Plane, Bailey's patent	6 50	14	42
47	Iron Jack-plane, Bailey's patent	7 50	15	47
48	Iron Fore-Plane, Bailey's patent	9 00	17	55
49	Iron Jointer-Plane, Bailey's patent	10 00	18	58
50	Wood Smoothing-Plane, Bailey's patent	3 00	8	30
51	Wood Fore-plane, Bailey's patent	4 50	10	35
52	Wood Jointer-Plane, Bailey's patent	4 75	12	36
53	Wood Jointer-Plane, Bailey's patent	5 50	14	40
	FROM POST & GODDARD.			
54	Machinists' Hand-Taps	17 60	25	75
55	Machinists' Hand-Taps	52 80	65	220
56	Machinists' Hand-Taps (your choice)			
57	Screw-Plates and Dies, size A	5 00	12	37
58	Screw-Plates and Dies, size B 1	8 00	15	45
59	Screw-Plates and Dies, size C 1	10 00	18	58
60	Screw-Plates and Dies, size D 1	13 00	20	70
61	Tap-Wrenches, size A	3 00	7	25
62	Tap-Wrenches, size B	4 00	9	30
63	Tap-Wrenches, size C	5 00	12	37
64	Set of 11 Taper Shank-Twist Drills, No. 1	19 75	29	90
65	Set of 29 Drills, straight shank, mounted, No. 9	12 00	18	60
66	Set of 60 Drills, steel wire gauge from 1 to 60, No. 12	8 00	15	45
67	Set of 21 Taper-Shank Drills, No. 3	44 00	58	175
68	Set of 9 Bit-Stock Drills, 1-16 to 3 8 in	2 80	6	25
69	Self-Centering Drill-Chucks, Beach's patent, for jewelers, No. 0	10 00	18	58
70	Self-Centering Drill-Chucks, Beach's patent, for drilling, No. 0	7 00	14	40
71	Self-Centering Drill-Chucks, Beach's patent, 0 to 3-16, No. 1	6 00	13	38
72	Self-Centering Drill-Chucks, Beach's patent, 1 to 60 S. W. E., No. IX	7 00	14	40
73	Self-Centering Drill-Chucks, Beach's patent, 0 to 1/4, No. 3	14 00	23	77
74	Drill-Grinding Machine, No. 1	10 00	18	58
75	Drill-Grinding Machine, No. 2	20 00	30	95
76	Auger-Bits, your choice of 4 sets	— —	—	—
	FROM L. W. POND.			
77	Foot-Lathe, No. 1	50 00	65	204
78	Foot-Lathe, No. 2	30 90	47	124
	FROM COLBY BROS. & CO.			
79	Miniature Steam-Engine and Boiler	1 36	5	23
	FROM RUSSELL & SPEIR.			
80	Steam-Engine (1 H. P.) and Boiler	300 00	310	1125
81	Steam-Engine (3 H. P.) and Boiler	600 00	640	3250
82	Steam-Engine (5 H. P.) and Boiler	800 00	858	3000
83	Steam-Engine (10 H. P.) and Boiler	1200 00	1285	4500
84	Steam-Pump, C. B. Hardick's, No. 0	120 00	155	540
85	Steam-Pump, Cameron & Co.'s, No. 1	150 00	192	675
86	Steam-Pump, Cameron & Co.'s, No. 2	200 00	257	900
87	American Submerged Pump	12 00	19	65
	FROM GEORGE TALLCOT.			
88	Turbine Water-Wheel, Reynold's, 12 in	105 00	125	360
89	Turbine Water-Wheel, Reynold's, 24 in	226 50	270	800
90	Turbine Water-Wheel, Reynold's, 36 in	384 50	460	1350
91	Rotary Blower, Root's patent No. 1	$52 00	70	275
92	Rotary Blower, Root's patent, No. 2	80 00	105	420
93	Portable Forge, Root's patent, No. 1	48 00	65	260
94	Portable Forge, Root's patent, No. 3	80 00	105	420
	FROM THE AMERICAN SAW CO.			
95	Circular Saw	125 00	135	473
96	Cross-Cut Saw	6 60	14	42
	FROM A. P. & M. STEPHENS.			
97	Labor-Saving Vise, 2-in. jaw	4 00	9	32
98	Labor-Saving Vise, 4½-in. jaw	12 00	28	58
	FROM THE STANLEY RULE & LEVEL CO.			
99	Boxwood two-foot Rule	2 50	6	25
100	Silver-Plated Triangular Drawing-Scale	6 00	16	52
101	Pocket Sheet-Metal Gauge	5 00	13	37
102	Arkansas Oil-Stone	1 75	5	22
103	Arkansas Oil-Stone, mahogany case	3 25	8	30
104	Gear or Cog-Wheel Calculating-Rule	4 00	12	36
	WESTERN & COMPANY'S AGENCY.			
105	Preparing and Filing a Caveat	25 00	28	80
106	Application for a Patent	30to40	35	100
107	Application for Patent and first Government fee	46to56	50	150
108	Application for Patent and all Government fees	66to76	75	250
	FROM J. W. HUTCHINSON.			
109	English Breech-loading double-barrel Gun	100 00	110	350
110	English Muzzle-loading double-barrel Gun	75 00	85	250
111	Breech-loading Rifle, the Allen	20 00	46	150
112	Revolver, Smith & Wesson's, No. 1½	12 50	19	65
113	Revolver, Smith & Wesson's, No. 2	15 00	22	75
	FROM MASON & HAMLIN.			
114	Melodeon, portable, No. 1, 4 octave	50 00	66	200
115	Melodeon, resonant, style G, 5 octave	170 00	146	510
116	Pipe-Organ, church use, style No. 29	675 00	579	2000
	FROM J. S. & C. ODELL.			
117	Pipe-Organ	500 00	430	1500
118	Pipe-Organ	700 00	600	2100
119	Bradbury Square Piano-Forte, No. 4	650 00	430	1500
120	Steinway's No. 1 Grand Piano	1200 00	860	3000
	THE AMERICAN WATCH CO., WALTHAM, MASS.			
121	Silver Watch	20 00	32	100
122	Silver Watch	35 50	48	142
123	Gold Watch	50 00	65	200
124	Lady's Gold Watch	100 00	110	350
	FROM THE UNITED STATES WATCH CO.			
125	Silver Watch	40 00	50	150
126	Silver Watch	66 00	75	275
127	Gold Watch	100 00	100	300
128	Silver Watch	104 00	104	312
129	A Sewing Machine (your choice)	65 00	65	200
	FROM MCALLISTER.			
130	Microscope and 48 objects	10 00	14	40
	FROM COLBY BROS. & CO.			
131	Velocipede for Boys	16 00	16	52
	FROM MCALLISTER.			
132	Magic-Lantern, No. 433	20 00	30	95
	FROM H THOMPSON.			
133	An Easy Chair			
	FROM D. APPLETON & CO.			
134	New American Cyclopædia, 16 vols	80 00	80	213
	FROM G. & C. MERRIAM.			
135	Webster's Unabridged Pictorial Dictionary	12 00	15	45
136	Webster's National Pictorial Dictionary	6 00	10	35
	FROM WESTERN & COMPANY.			
137	One back vol. Manufacturer and Builder, unbound, post-paid	1 75	6	25
138	Two back volumes Manufacturer and Builder, unbound, post-paid	3 50	11	37
139	One back vol. Manufacturer and Builder, bound, post-paid	2 50	9	32
140	Two back volumes Manufacturer and Builder, bound, post-paid	5 00	18	58
141	Cover for binding the Manufacturer and Builder, post-paid	60	3	21
142	A $10 Library (your choice from list in special sheet),	10 00	18	58
143	A $15 Library, "	15 00	24	85
144	A $20 Library, "	20 00	31	106
145	A $25 Library, "	25 00	38	125
146	A $30 Library, "	30 00	44	144
147	A $35 Library, "	35 00	50	162
148	A $40 Library, "	40 00	56	177
149	A $45 Library, "	45 00	62	192
150	A $50 Library, "	50 00	68	207
151	A $60 Library, "	60 00	80	237
152	A $75 Library, "	75 00	100	282
153	A $100 Library, "	100 00	125	360
154	A choice of good Books (see terms in another column)			
155	A choice of convenient Book-Cases (see special sheet)			
156	A choice of popular Music (see terms in special sheet)			
157	A choice of Games and Toys, (see terms in special sheet)			

A prize through by mail or express.

We have taken especial pains to select in making up our price list the NEWEST and very BEST articles. No charge will be made for boxing or packing any article on our list. The Premiums, Nos. **4** to **7** inclusive, **31** to **35** inclusive, **79**, **99**, **101**, **105** to **108** inclusive, **121** to **128** inclusive, **137** to **141** inclusive, **154**, **156**, **157**, will each be delivered FREE of charge by mail or express (at the Post-office or express office nearest recipient) to any place in the United States or Territories. The other articles cost the recipient only the freight after leaving the manufactory of each, by any conveyance specified.

As an aid to those who engage upon large clubs, we will count subscriptions by *one* individual for 1869, 1870, and 1871, as *three* subscribers toward a premium. Every *new* subscriber should have the work upon the beginning. Bound volumes may be counted in the same way—each as one subscriber—except, of course, when they are obtained as a premium:

Do not fail to note the following Points:

1. All subscribers sent by one person count, though from one or a dozen different post-offices. But

2. State with each name or list of names sent that it is for a premium.

3. Send the names as fast as obtained, that the subscribers may begin to receive the paper at once. You can have any time, from one to six months, to fill up your list.

4. Send the exact money with each list of names, so that there may be no confusion of money accounts.

5. Old and new subscribers all count in premium clubs, but a portion, at least, should be new names; it is partly to get these that we offer premiums to canvassers.

N.B.—The extra copy to clubs of ten or twenty is not given where premium articles are called for.

6. Specimen numbers, cards, and show-bills will be supplied free, as needed by canvassers; but they should be used carefully and economically, as they are very costly.

7. Remit money in Checks on New York banks or bankers, payable to order of WESTERN & COMPANY, or send Post-Office Money Orders. If neither of these is obtainable, Register Money Letters, affixing stamps both for the postage and registry; put in the money and seal the letter in the presence of the postmaster, and take his receipt for it. Money sent in any of the above ways is at our risk.

DESCRIPTIVE LIST OF PREMIUMS.

Every Premium in the annexed list is described in the December MANUFACTURER AND BUILDER, *and also in a* **Special Descriptive Sheet,** *which will be sent* **free** *to every one desiring it. We have room here for the following only:*

Nos. 105 to 108—To Procure a Patent without Money.—We have met with many having valuable inventions, which inventors are anxious to get patented, but are unable to afford the expense, and consequently fail to secure the profits which a patent might produce. To such as are in this position, we make the following liberal offer: **No. 108**—We will prepare an application for a patent, attend to its passage through the Patent Office, and pay all government fees and incidental expenses attending the same, for any inventor presenting a patentable invention, who will get up a club of seventy-five subscribers for THE MANUFACTURER AND BUILDER for one year at $1,50 each, or 250 at $1 each, and send us the money by post-office order. If this application should be rejected, they may send us an additional list of thirty subscribers at $1.50 each, and the subscription money for the same, on receipt of which we will prepare and prosecute a second application, paying all government fees and incidental expenses. No. **107**—For a list of fifty subscribers at $1.50 each, or 150 at $1 each, with the cash accompanying it, we will prepare an application, attend to its passage through the office, and pay the government fee ($15), the applicant paying the second government fee of $20. No. **106**—For a list of thirty-five subscribers at $1.50, sent in the same way, we will prepare and prosecute an application, the applicant paying the government fee. No. **105**—for twenty-eight subscribers at $1.50 each, or eighty at $1 each, we will prepare and file a caveat, furnish the necessary drawings, (which we also furnish in all the above cases), and pay all government fees. All cases placed in our hands under these arrangements will receive our best attention, equally with those for which our fees have been paid in cash, and will be appealed to the Board of Examiners-in-Chief if necessary, the applicant paying the government fee of $10 on such appeal. If the inventor has no model to accompany his application, he may procure additional subscribers, the premium on which (see cash rates) will enable him to pay for the model. A club of 100 names has been obtained in a single establishment where from 150 to 200 hands are employed. A village of 500 inhabitants will take this number readily.

No. 129—Sewing Machines.—Your choice! A $65 machine for 65 subscribers, at $1.50 each.—It makes no difference to us which machine we send, or whether it is selected at first or at the last moment. No charge for boxing the machines; they go safely as freight. For circulars, giving full particulars in regard to style of machines, fixtures, etc., as well as instructions, send to **Grover & Baker Manufacturing Co.,** 495 Broadway, New York; **Florence Sewing Machine Co.,** 505 Broadway, New York; **Wilcox & Gibbs Sewing Machine Co.,** 658 Broadway, New York; **Singer Sewing Machine Co.,** 458 Broadway, New York.

Nos. 137, 138—Volumes of the Manufacturer and Builder.—The unbound volumes of THE MANUFACTURER AND BUILDER consist of a set of numbers for a year, each separate in its own paper cover. These volumes amount to a valuable Library on all matters pertaining to the Industrial Arts, and contain more varied information on manufacturing building, and mechanical subjects than can be obtained in books costing three times as much. The price of the volumes unbound is $1.50 each, at the office, or $1.75 if sent by mail, as they must be post-paid. They are profusely illustrated, the engravings used in them having alone cost thousands of dollars. For ordinary use, the sets of numbers unbound will answer quite well.

Nos. 139, 140—Bound Volumes of the Manufacturer and Builder.—*New* subscribers almost invariably desire to secure the back numbers of THE MANUFACTURER AND BUILDER from its commencement. Some desire them bound in our uniform style, while others prefer to get the loose numbers and have them bound to suit their own tastes. *Our* binding is very neat, and being done in large quantities at one time, is furnished at a *very cheap* rate. It is moreover very handsome, being of cloth, with gilt title and back, sides embossed and ornamented with a neat architectural device stamped in gold. The price of the volumes is $2.50 each, sent post-paid.

No. 141—Covers for Binding the Manufacturer and Builder.—These are described in premium 139, 140. Now ready for 1869 and 1870. Be careful to state *which year* you require. Any country binder will insert the year's numbers in one of these covers at a moderate cost. Price, 50 cents; sent, *post-paid*, on receipt of three subscribers at $1,50 for each cover.

Nos. 142 to 154—Good Libraries.—In these premiums we offer a choice of books for manufacturers, mechanics, artisans, builders and others. The person entitled to any one of the premiums 142 to 153, may select any books desired from the list published in our Special Premium Sheet, to the amount of the premiums, and the books will be forwarded, post or express paid. $25 or $50 worth of books pertaining to the industrial arts will give the boys new ideas, set them to thinking and observing, and thus enable them to make their heads help their hands. Any good book will, in the end, be of far more value to a youth than to have an extra hundred dollars on coming to manhood. ☞ Let the mechanics of a neighborhood unite their efforts, and through these premiums get an industrial library for general use.

No. 154—General Book Premium.—Any one sending twenty-five or more names may select books from our list to the amount of ten cents for each subscriber sent at $1; or thirty cents for each name sent at $1.20; or sixty cents for each name at $1.50. *This offer is only for clubs of twenty-five or more. The books will be sent by mail or express, prepaid through by us.*

SPECIMEN COPIES, CIRCULARS, SHOW-BILLS, etc.,

will be furnished free of charge in sufficient quantities to meet the reasonable requirements of agents. We would respectfully request that they do not waste them, but distribute them judiciously. If some unexpected event should prevent them from continuing in the business, they will do the square thing by us by giving their outfit to some friend, who will continue the business where they have left off; and who will no doubt be grateful for the opportunity of receiving profitable employment.

Postage.

Every subscriber pays his own postage at the office where he receives the paper. This is only twenty-four cents per year, or six cents per quarter, payable in advance.

Don't Give up Your Town

until everybody has been supplied with a circular and has had a chance to subscribe; and be sure that you

PUBLICATIONS.

leave your address, so that they may know where to find you in case they should make up their minds to take the magazine after you have left them. Make all drafts, money-orders, and registered letters payable to the order of Western & Company, publishers, and address all communications

WESTERN & COMPANY, Publishers.
NO. 37 PARK ROW, NEW YORK.

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STEADY EMPLOYMENT AND GOOD PAY.		
For every club of 4 subscribers.....	$1 00	
" " " 10 "	3 00	
" " " 15 "	6 00	
" " " 20 "	10 00	
" " " 30 "	16 50	$1 50
" " " 40 "	24 00	4 00
" " " 50 "	32 50	7 50
" " " 75 "	48 75	11 25
" " " 100 "	65 00	15 00
" " " 200 "	143 00	40 00
" " " 500 "	350 00	100 00
" " " 1000 "	700 00	200 00

INTERMEDIATE CLUBS.

It often happens that clubs are made up of numbers that are not found in the above table. Names may be added to clubs at the following rates :

In clubs of	4	and less than	10..	$1 25	for each name.
" "	10	" "	15..	1 20	" "
" "	15	" "	20..	1 10	" "
" "	20	" "	30..	1 60	" "
" "	30	" "	40..	95	" "
" "	40	" "	50..	90	" "
" "	50	" "	200..	85	" "
" "	200	" "	500..	80	" "
" "	500	" "	1000..	80	" "
" "	1000	and over.....		80	" "

The Profits of the Cash Business, it will be seen by the above tables, are large and accrue rapidly. Every experienced canvasser knows that it is far easier to obtain 4 subscribers to a paper like THE MANUFACTURER AND BUILDER at $1 50 each than to get 1 subscriber to a high-priced magazine, costing $6. This is more strikingly evident when the fact is taken into consideration that our paper, costing only $1 50, is ACTUALLY SUPERIOR IN EVERY RESPECT TO ANY THING OF THE KIND IN THE COUNTRY COSTING TWICE THAT SUM.

There is another point in favor of our Magazine, as compared with a higher-priced periodical. This is the well-known fact, that in a manufacturing establishment, or even in a town, the working-men will rarely look at a paper costing $3 or $6, and the result is that only rich persons, comparatively, and proprietors can be solicited with any success. Now, these persons are scarce in any community; and a paper that comes within the means and comprehension of the masses or majority of the people, of course commands an immensely wide field. Hence, instead of getting only the proprietor of a manufactory, or the rich men of a town, the working-men can be approached with success; and out of a single establishment as many as 100 subscribers have easily been obtained. This is a very important point to canvassers, and where the large profits with but little effort come in. Try it.

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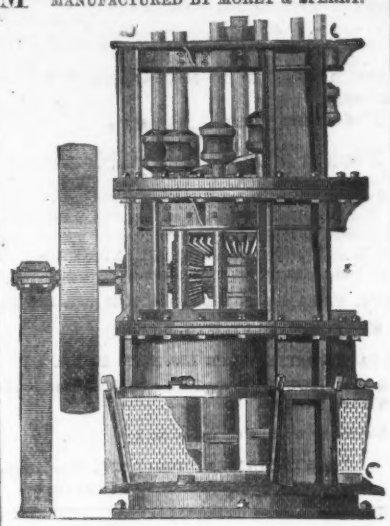

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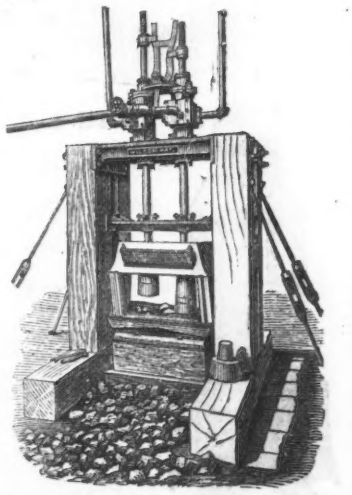

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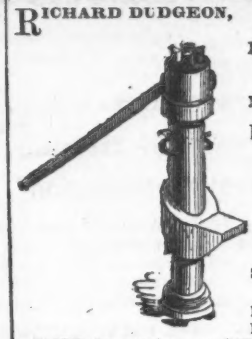

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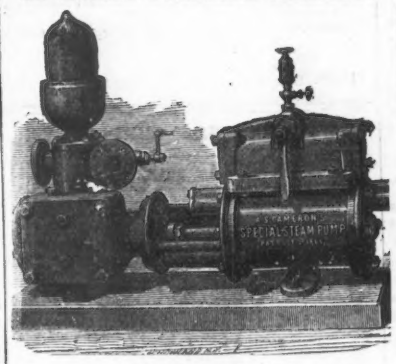

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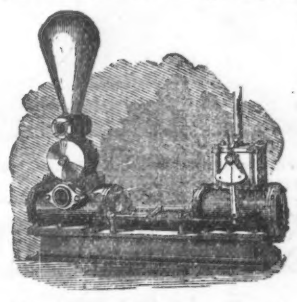

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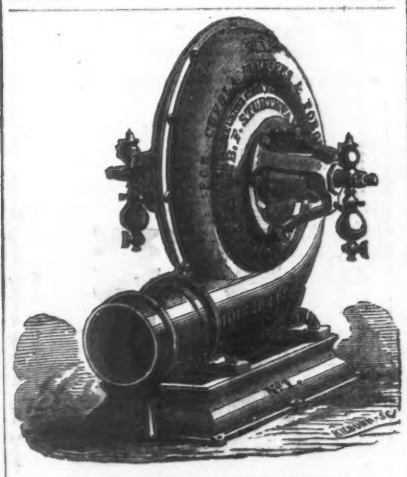

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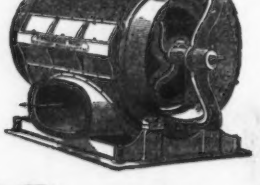

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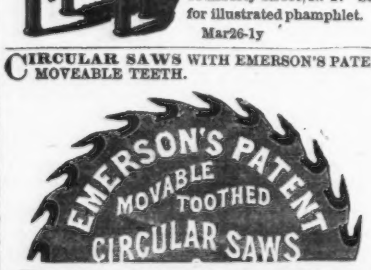

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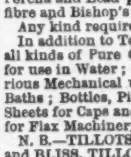

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